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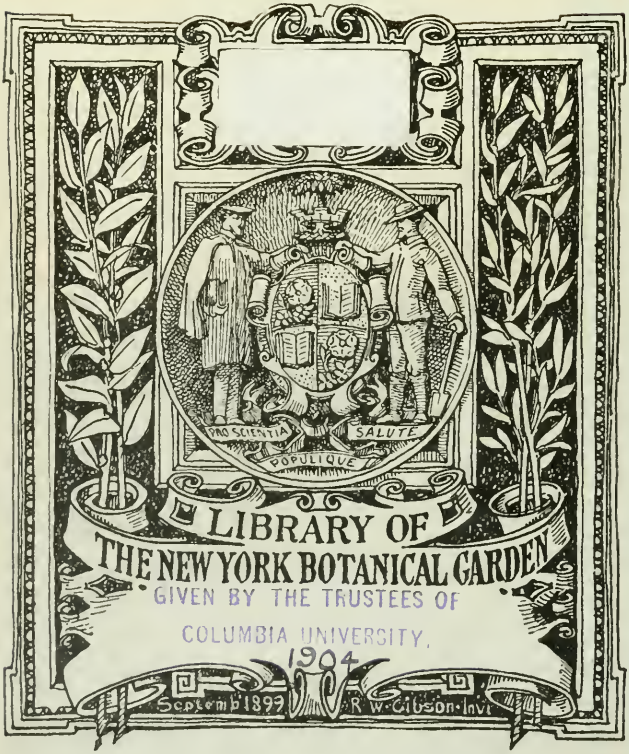

TRANSACTIONS

OF THE

ILLINOIS STATE HORTICULTURAL SOCIETY

FOR 1873,

BEING THE PROCEEDINGS OF THE EIGHTEENTH ANNUAL MEETING, HELD AT CHAMPAIGN, DEC. 9, 10 AND 11;

CONTAINING, ALSO, THE

PROCEEDINGS OF THE SEVENTH ANNUAL MEETING OF

THE NORTHERN ILLINOIS HORTICULTURAL SOCIETY,

WARSAW HORTICULTURAL SOCIETY,

AND OTHER LOCAL HORTICULTURAL SOCIETIES;

ALSO,

LAWS RELATING TO HORTICULTURE, LECTURES AND ESSAYS FROM PROMINENT AND SUCCESSFUL FRUIT-GROWERS, AND EMINENT SCIENTISTS;
LISTS OF FRUITS, TREES, ETC.

EDITED BY THE SECRETARY.

NEW SERIES—VOL. VII.

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FRUIT OR HORTICULTURAL DISTRICTS.

I. NORTHERN ILLINOIS.

1. *Fox River District*—Boone, Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, LaSalle, McHenry, and Will—12.

2. *Rock River District*—Bureau, Carroll, Henry, Jo Daviess, Lee, Ogle, Putnam, Rock Island, Stephenson, Whiteside, Winnebago—11. Total, 23.

II. CENTRAL ILLINOIS.

3. *Illinois River District*—Adams, Brown, Cass, Fulton, Hancock, Henderson, Knox, McDonough, Marshall, Mason, Mercer, Menard, Morgan, Peoria, Pike, Schuyler, Scott, Stark, Tazewell, Warren, Woodford—21.

4. *Grand Prairie District*—Champaign, Christian, Coles, DeWitt, Douglas, Edgar, Ford, Iroquois, Livingston, Logan, McLean, Macon, Moultrie, Piatt, Sangamon, Shelby, Vermillion—17. Total, 38.

III. SOUTHERN ILLINOIS.

5. *Centralia, or Wabash District*—Clark, Clay, Crawford, Cumberland, Edwards, Effingham, Fayette, Franklin, Hamilton, Jasper, Jefferson, Lawrence, Marion, Richland, Wabash, Wayne, White—17.

6. *Alton, or Kaskaskia District*—Bond, Calhoun, Clinton, Greene, Jersey, Macoupin, Madison, Monroe, Montgomery, Perry, Randolph, St. Clair, Washington—13.

7. *Grand Chain District*—Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Pulaski, Saline, Union, Williamson—11. Total, 41. Grand Total, 102.

259815

OFFICERS FOR 1874.

PRESIDENT:

ROBERT DOUGLAS, Waukegan, Lake County.

VICE-PRESIDENTS:

1st District—S. G. MINKLER.....Oswego, Kendall County.
2d " A. R. WHITNEY.....Franklin Grove, Lee County.
3d " A. C. HAMMOND.....Warsaw, Hancock County.
4th " L. C. FRANCIS.....Springfield, Sangamon County.
5th " B. PULLEN.....Centralia, Marion County.
6th " ISAAC SNEDEKER.....Jerseyville, Jersey County.
7th " T. A. E. HOLCOMB.....Cobden, Union County.

SECRETARY:

O. B. GALUSHA.....Morris, Grundy County.

ASSISTANT SECRETARY:

H. J. DUNLAP.....Champaign, Champaign County.

TREASURER:

JONATHAN HUGGINS.....Woodburn, Macoupin County.

EXECUTIVE BOARD:

ROBERT DOUGLAS, M. L. DUNLAP, JAMES E. STARR, ARTHUR BRYANT, Sr., and O. B. GALUSHA.

STANDING COMMITTEES FOR 1874.

Gentlemen on these Committees are expected to act independently, and each is requested to report upon his topic with reference to his particular district—Northern, Southern, or Central, as the case may be. It is believed that additional facts and principles may be discovered, relating to the *conditions* to which fruit culture in Illinois must conform, by a careful study of atmospheric phenomena, our soils, insects, and birds, in connection with vegetable physiology and the hygiene of plants.

NORTHERN.	CENTRAL.	SOUTHERN.
	METEOROLOGY.	
Edward H. Beebe, Geneva.	Prof. J. B. Turner, Jacksonville.	W. C. Flagg. Moro.
	GEOLOGY AND SOILS.	
T. McWhorter, Aledo.	Prof. D. C. Taft, Champaign.	H. C. Freeman, Cobden.
	BOTANY AND VEGETABLE PHYSIOLOGY:	
Mrs. P. V. Hathaway, Damascus.	Prof. T. J. Burrill, Champaign.	Mrs. T. A. E. Holcomb, Cobden.
	ENTOMOLOGY:	
D. B. Wier, Lacon.	H. J. Dunlap, Champaign.	J. R. Muhlemann, Woodburn.
	ORNITHOLOGY:	
L. K. Scofield, Freeport.	G. W. Minier, Minier.	Mrs. D. Gow, Cobden.
	ORNAMENTAL AND TIMBER TREES:	
H. C. Graves, Sandwich.	E. Daggy, Tuscola.	J. S. Taylor, Centralia.
	ORNAMENTAL AND LANDSCAPE GARDENING:	
A. G. Humphrey, Galesburg.	W. W. Clayton, Jacksonville.	J. C. Huggins, Woodburn.
	VEGETABLE GARDENING:	
E. C. Hathaway, Ottawa.	A. L. Hay, Jacksonville.	O. L. Barler, Upper Alton.
	ORCHARD CULTURE:	
D. W. Scott, Galena.	Tyra Montgomery, Mattoon.	A. M. Brown, Villa Ridge.
	VINEYARD CULTURE:	
James Crow, Crystal Lake.	Dr. J. W. Hollowbush, Warsaw.	Dr. E. S. Hull, Alton.

ADDITIONAL COMMITTEES FOR 1874.

	FRUIT GARDENING, OR BERRY CULTURE:	
G. H. Rugg, Ottawa.	B. F. Rice, Philo.	H. J. Hyde, Godfrey.
	UTILIZING FRUITS:	
Samuel Edwards, Princeton.	B. L. T. Bourland, Peoria.	Dr. B. F. Long, Alton.
	FLORICULTURE:	
Mrs. Oscar Taylor, Freeport.	M. C. McLain, Charleston.	Mrs. P. R. Wright, Cobden.

LIST OF MEMBERS FOR 1874.

NAME.	POST OFFICE.	COUNTY.
Bailey A. H.....	...Rantoul	Champaign.
Baker John.....	Tolono.....	do.
Baldwin Elmer.....	Farm Ridge.....	LaSalle.
Baldwin Isaac.....	Jacksonville.....	Morgan.
Barler O. L.....	Upper Alton.....	Madison.
Bassett John R.....	Aledo	Mercer.
Bonham Jeriah.....	Carbondale.....	Jackson.
Boyd Martin.....	Aledo	Mercer.
Bourland B. L. T...	Peoria.....	Peoria.
Bryant A., Sr.....	Princeton.....	Bureau.
Buckley Geo.....	Chicago.....	Cook.
Burrill T. J.....	Champaign.....	Champaign.
Caldwell W. B.....	Paris.....	Edgar.
Childs Erastus.....	Oneida.....	Knox.
Clapp Henry.....	Morris.....	Grundy.
Clark L. G.....	Channahon.....	Will.
Cramer R. S.....	New Boston.....	Mercer.
Curtis B. O.....	Paris.....	Edgar.
Curtis David S.....	do	do.
Daggy E.....	Tuscola.....	Douglas.
Davis H. W.....	Decatur.....	Macon.
Douglas C. W.....	Waukegan.....	Lake.
Douglas F. H.....	do	do.
Douglas Robert ...	do	do.
Douglas R. J.....	do	do.
Dunlap H. J.....	Champaign.....	Champaign.
Dunlap M. L.....	Savoy.....	do.
Dunning D. L.....	Jefferson.....	Cook.
Edwards Samuel...	Princeton.....	Bureau.
Ellsworth Lewis...	Naperville.....	DuPage.
Farnsworth Moses.	Philo.....	Champaign.
Fell C. E.....	Bloomington.....	McLean.
Fisher Michael.....	Indianola.....	Vermillion.
Flagg W. C.....	Moro.....	Madison.
Francis L. C.....	Springfield.....	Sangamon.
French R. H.....	Libertyville.....	Lake.
Galusha O. B.....	Morris.....	Grundy.
Garland A. M.....	Springfield	Sangamon.
Gaston A. H.....	Normal.....	McLean.
Gaston J. R.....	do	do.
Given A. Z.....	Champaign	Champaign.
Graham Geo. P.....	Aledo	Mercer.
Graham J. S.....	Paxton.....	Ford.
Graves H. C.....	Sandwich.....	DeKalb.
Griffing Henry.....	Hazle Dell.....	Cumberland.
Hammond A. C....	Warsaw.....	Hancock.
Hay A. L.....	Jacksonville.....	Morgan.
Hayes D. H.....	Aledo.....	Mercer.
Hollister E.....	Alton.....	Madison.
Hull E. S.....	do	do.
Humphrey A. G...	Galesburg.....	Knox.
Humphrey E. E...	Aledo.....	Mercer.
Hunt R. W.....	Galesburg	Knox.
Hyde H. J.....	Godfrey.....	Madison.
Kinney D. F.....	Rock Island.....	Rock Island.
Lee C. F.....	Minonk	Woodford.
Lee Mrs. M. A.....	do	do.
Lee Graham.....	Aledo.....	Mercer.
Long B. F.....	Alton.....	Madison.
Mahan I. S.....	Champaign.....	Champaign.
Mahanah L.....	Mt. Zion.....	
Mann W. H.....	Gilman.....	Iroquois.
McKinstry B. N...	Vellow Head	Kankakee.
McWhorter Tyler..	Aledo	Mercer.
Minkler S. G.....	Oswego	Kendall.
MontgomeryTyler.	Mattoon.....	Coles.
Mossier P. C.....	Homer.....	Champaign.
Nelson W. T.....	Wilmington.....	Will.
Parks John R.....	Tolono.....	Champaign.
Payne T. H.....	Fremont.....	Lake.
Pearson J. M.....	Godfrey	Madison.
Pepper Charles.....	Aledo.....	Mercer.
Pennington L. S...	Sterling	Whiteside.
Phinney J. B.....	Champaign	Champaign.
Pickrell Wm.....	Mechanicsburg...	Sangamon.
Rankin Robert.....	Payson.....	Adams.
Rice B. F	Philo.....	Champaign.
Rogers J. S.....	Marengo	McHenry.
Roots B. G.....	Tamaroa.....	Perry.
Roots Elizabeth ...	do	do.
Sabin D. D.....	Belvidere.....	Boone.
Scofield L. K.....	Freeport	Stephenson.
Scott D. W.....	Galena	Jo Daviess.
Seeley J. S.....	Oswego	Kendall.
Seeley Mrs. J. S...	do	do.
Shepherd Smiley...	Hennepin	Putnam.
Snedeker Issac.....	Jerseyville	Jersey.
Stewart John.....	Quincy.....	Adams.
Vernon Marion.....	New Boston.....	Mercer.
Vickroy H. K.....	Champaign.....	Champaign.
Westgate C. A.....	Peotone.....	Will.
Whitney A. R.....	Franklin Grove..	Lee.
Wier D. B.....	Lacon.....	Marshall.
Woodard L.....	Marengo	McHenry,
Wright Grove	Rock Falls.....	Whiteside.
Beach J. A.....	Woodburn.....	Macoupin.
Blodgett Daniel ...	Brighton	do.
Clark H	do.	do.
Compton George...	Woodburn.....	do.
Corbin L. B.....	Carlinville.....	do.
Cummings J. F....	Bunker Hill.....	do.
Eldred E. B.....	Carlinville.....	do.
Eldred Moses.....	do.	do.
Flannagan John ...	Bunker Hill.....	do.
Gore David	Carlinville.....	do.
Huggins P. C.....	Bunker Hill.....	do.
Huggins J. A.....	Woodburn.....	do.
Huggins Mrs. J.C.	do.	do.
Huggins Jona	do.	do.
Hunter George.....	Carlinville.....	do.
McConnell J. T.....	do.	do.
Pettengill J. A.....	Bunker Hill.....	do.
Williams E. S.....	do.	do.
Summerfield Thos.	do.	do.
Wood R. O.....	Woodburn.....	do.

MEMBERS FROM OTHER STATES.

NAME.	POST OFFICE.	STATE.
Brown Mercer.....	St. Joseph.....	Michigan.
Foster Suel.....	Muscatine.....	Iowa.
Berryhill John G...	Toolsboro.....	Louisa Co., Ia.
Mathews B. A.....	Knoxville.....	Iowa.
McAfee H. H.....	Ames.....	Iowa.
McWhorter A. L...	Altoona.....	Polk Co., Iowa
Stickney J. S.....	Wauwatosa.....	Wisconsin.
Willet R. S.....	Malcom.....	Iowa.

HONORARY MEMBERS.

Dr. John A. Warder, Cleves, Ohio.
Prof. J. H. Tice, St. Louis, Mo.
Prof. C. V. Riley, St. Louis, Mo.
Hon. Suel Foster, Des Moines, Iowa.
J. H. Nicholson, Brideport, Ind.
Dr. Allen Furness, Danville, Ind.
Dr. Wm. LeBaron, State Entomologist, Geneva, Ill.

DELEGATES FROM OTHER SOCIETIES.

Adams County Horticultural Society,
ROBERT RANKIN, JOHN STEWART, T. BUTTERWORTH.

Alton Horticultural Society,
O. L. BARLER, JONA. HUGGINS, W. C. FLAGG, ISAAC HILLIARD, A. A. HILLIARD.

Warsaw Horticultural Society,
A. C. HAMMOND, J. D. STROUP.

Galesburg Horticultural Society,
R. W. HUNT, T. J. HALE, MRS. J. V. N. STANDISH.

CONSTITUTION AND BY-LAWS

AS AMENDED AT THE ANNUAL MEETING, 1870.

CONSTITUTION.

I. This Association shall be known as the ILLINOIS STATE HORTICULTURAL SOCIETY.

II. Its objects shall be the advancement of the science of Pomology and of the art of Horticulture.

III. Its members shall consist of *Annual* members, paying an annual fee of one dollar; of *Life* members, paying a fee of twenty dollars at one time; and of *Honorary* members, who shall only be persons of distinguished merit in Horticulture or kindred sciences, who may, by vote, be invited to participate in the privileges of the Society. The wives of members shall be members without fee.

IV. Its officers shall consist of a President, one Vice-President from each Fruit District in the State, a Secretary, an Assistant Secretary, a Treasurer, and an Executive Board, which shall consist of the President, the last three Ex-Presidents, and the Secretary; all of whom shall be elected at the annual meeting, and serve from the first of January until the thirty-first of December, and until their successors are elected.

V. It shall hold an annual meeting and other meetings and an annual fair, as the Society or the Executive Board may direct.

VI. This Constitution may be amended at any regular meeting, by a two-thirds vote of the members present.

BY-LAWS.

I. The President shall preside at all meetings of the Society; call meetings of the Executive Board, and, under its directions, have a general superintendency of the affairs of the Society, and direction of the expenditure of money; he shall deliver an annual address upon some subject connected with Horticulture, and shall appoint all committees unless otherwise ordered.

II. The Vice-Presidents, in the order of their Districts, shall act in case of absence or disability of the President; and shall, by correspondence and personal intercourse with the horticulturists of the various counties of their respective districts, endeavor to organize local societies, obtain accurate information of the condition and progress of Horticulture therein, and report annually, in writing, to the Society.

III. The Secretary shall conduct the correspondence of the Society; have charge of its papers, books, and reports, and prepare its reports for publication; and shall receive, for so doing, his necessary expenses for postage, stationery, printing, expressage, and office rent, and the sum of three hundred dollars per annum; he shall render an annual account in detail of such necessary expenses, which shall be referred, with the Treasurer's report, to a special auditing committee.

IV. The Assistant Secretary, in the case of the absence or disability of the Secretary, shall perform his duties, and shall aid him, at the annual meeting, in making his report.

V. The Treasurer shall receive and keep an accurate account of all moneys belonging to the Society, and disburse the same upon the written orders of the President, which he shall retain and file as vouchers. He shall make an annual report to the Society of the receipts and disbursements, which, with the vouchers, shall be referred to a special auditing committee, appointed at the annual meeting. Before entering upon his duties, he shall give bond to the Society in the sum of five thonsand dollars, for the faithful performance of his duties—such bond to be approved by the Executive Board.

VI. The Executive Board shall, subject to the direction of the Society, manage all its affairs.

VII. There shall be chosen annually, by the Executive Board, a Standing Committee, to consist of one or more members from each of the three divisions—Northern, Central, and Southern—of the State, on the following subjects:

1. Meteorology in its relation to Horticulture.
2. Geology and Soils.
3. Botany and Vegetable Physiology.
4. Entomology.
5. Ornithology.
6. Ornamental and Useful Trees.
7. Ad Interim.
8. Vegetable Gardening.
9. Orchard Culture.
10. Vineyard Culture.

VIII. These By-Laws may be altered at any meeting by a majority vote.

LAWS AFFECTING HORTICULTURE.

An Act to Incorporate the Illinois State Horticultural Society.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly*, That Smiley Shepherd, O. B. Galusha, S. G. Minkler, W. C. Flagg, J. T. Little, W. H. Van Epps, Lewis Ellsworth, Jason C. Ayres, W. A. Pennell, J. W. Fell, W. Durley, Samuel Edwards, their associates and successors, members of the Illinois State Horticultural Society, be and are hereby declared to be a body politic and corporate, known by the name and style of "*The Illinois State Horticultural Society*."

SEC. 2. The object of the Society being to promote the science of Pomology and the art of Horticulture, they shall be allowed, for those purposes only, to take and hold real and personal estate to the amount of fifty thousand dollars.

SEC. 3. This Society shall have the right to contract and be contracted with, to sue and to be sued, to plead and to be impleaded, to answer and to be answered unto, in all the courts of law and equity of this State, and shall further enjoy all the privileges incident to incorporations of said character, and not inconsistent with the laws of this State.

SEC. 4. It shall and may be lawful for said corporation to have and use a common seal, and the same at their pleasure to change, alter, and make anew, and in general have and exercise all such rights, privileges, and immunities as by law are incident to or necessary to the Society herein constituted.

SEC. 5. The Society shall have power to alter or amend their present constitution, to make, alter, or repeal such by-laws as may be deemed necessary for carrying out the objects of the Society.

SEC. 6. This act shall be in force from and after its passage.

Approved February 16, 1865.

[NOTE.—The Society was *first* incorporated Feb. 11th, 1857—two months after its organization—ED.]

An Act for the Protection of Fruit and Ornamental Trees, Shrubbery, and Vegetable Products.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly*, That if any person or persons, in this State, shall willfully, maliciously, and without lawful authority, cut down, root up, sever, injure, peel, or destroy any fruit or ornamental trees, cultivated root or plant, fruit, or other vegetable production, grape, strawberry, or cranberry vines, currant, gooseberry, raspberry, or cultivated blackberry bushes, standing or growing on or being attached to the land of another, or shall willfully and without lawful authority, cut down, root up, destroy, or injure any fruit or ornamenal tree or shrubbery, planted or growing on any street, lane or alley, or

public grounds in any city, borough, or incorporated town in said State, every such person so offending, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine of not more than five hundred dollars, or by imprisonment in the jail of the county not exceeding three months, or both, at the direction of the court, and shall, moreover, be liable in double the amount of damages to the party injured.

This law to take effect from and after its passage.

Approved February 15, 1865.

An Act for the Protection of Growing Fruit.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly*, That if any person or persons shall, hereafter, enter the enclosure of any person without leave or license of such owner, and destroy or carry away any part or portion of the fruit of any apple, pear, peach, plum, or other fruit tree or bush, such person or persons shall be deemed guilty of a misdemeanor, and, upon conviction thereof, may be fined in any sum not less than ten nor more than fifty dollars, and may be imprisoned in the county jail for any period of time not exceeding twenty days. The penalties incurred by violation of this act may be enforced by indictment in any court having jurisdiction of misdemeanors in the county where the offence is committed, or the fine may be recovered in an action of debt before any justice of the peace of such county.

Approved February 16, 1865.

An Act for the Protection of Orchards, and to Prevent the Destruction of Small Birds.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly*, That it shall not be lawful, in this State, for any person to shoot, or in any other manner to kill or destroy, or to entrap, ensnare, or otherwise capture any of the following description of birds, to-wit: The blue bird, swallow, martin, mosquito hawk, whip-poor-will, cuckoo, woodpecker, cat bird, brown thrasher, red bird, hanging bird, rice bird, sparrow, wren, humming bird, dove, goldfinch, and mocking bird.

SEC. 2. Every person who willfully violates the provisions of the preceding section, or who shall willfully destroy the nest or eggs of any of the birds herein before designated, shall be punished by a fine of not more than five dollars for each offense.

This act to take effect and be in force from and after its passage.

Approved February 24, 1859.

An Act making an appropriation in aid of the State Horticultural Society of Illinois.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly*, That there be appropriated for the use of the State Horticultural Society, to be expended in the payment of premiums, in publishing the Transactions of said Society, procuring scientific investigations relating to Horticulture, and paying expenses of Ad Interem Committees, the sum of two thousand dollars per annum.

SEC. 2. The said sum of two thousand dollars shall be paid to the Treasurer of said State Horticultural Society, on the order of the President and Secretary of the same.

Approved February 28, 1867.

[This law, although inoperative under the New Constitution of the State, is published for the information of new members as to the means by which the Society has been enabled to publish its "new series" of reports.—SECRETARY.]

An Act for the Protection of Consignors of Fruit, Grain, Flour, etc., to be sold on Commission.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented in the General Assembly*, That if any warehouseman, storage, forwarding, or commission merchant, or his or their agents, clerks or employes shall convert to their own use the proceeds or profits arising from the sales of any fruits, grain, flour, beef, pork, or any other goods, wares, or merchandise, otherwise than as instructed by the consignors of said goods, and shall on the demand of the consignor fail to deliver over the proceeds or profits of said goods after deducting the usual per cent. on the sales as commission, shall be found guilty of a misdemeanor. And any person or persons who shall be found guilty of retaining or embezzling any money prohibited in this section, not exceeding one hundred dollars, shall be punished by a fine of not more than five hundred dollars, or imprisoned in the jail of the county not exceeding three months, or both, at the discretion of the court, and shall, moreover, be liable in double the amount of damages to the party injured; any person or persons who shall be found guilty of retaining or embezzling a greater sum than one hundred dollars, shall be punished by fine, not more than five hundred dollars, or imprisoned in the jail of the county not exceednig one year, or both, at the discretion of the court; and shall, moreover, be liable in double the amount of damages to the party injured.

SEC. 2. This act to take effect from and after its passage.

Approved March 4, 1869.

An Act to permit the planting of Shade and Ornamental Trees along the Public Roads.

SECTION 1. *Be it enacted by the people of the State of Illinois, represented at the General Assembly*, That it shall be lawful for owners or occupants of lands bordering upon any public road in this State, to plant shade and ornamental trees along and in such road, at a distance not exceeding one-tenth of the legal width of the road from its margin.

SEC. 2. This act shall be deemed a public act, and be in force from and after its passage.

Approved March 25, 1869.

PROCEEDINGS

OF THE

EIGHTEENTH ANNUAL MEETING

HELD AT

Champaign, December 9, 10 and 11, 1873.

The Annual Convention of the Illinois State Horticultural Society opened in the new building of the State Industrial University, in Champaign, at half past ten o'clock of Tuesday, December 9th, 1873. The President not being present, the meeting was called to order by the Secretary, and Vice-President Isaac Snedecker was chosen to fill the chair.

Rev. O. L. Barler, of Upper Alton, upon request of the chairman, officiated at the opening exercises.

A programme of business was presented by the Secretary, which was adopted and adhered to, as nearly as might be, throughout the meeting.

Mr. W. T. Nelson, Vice-President for the first district, being called, read the following

REPORT OF THE FIRST HORTICULTURAL DISTRICT.

Mr. President and Gentlemen of the State Horticultural Society:

In accordance with the duties incumbent on me as Vice-President for the first district, I addressed letters of inquiry to one or more persons in each county in the district, and received answers from nearly all, saying they would report; but, whether through the fault of "Uncle Sam" or the persons addressed, only three of the promised reports have reached me, up to this date.

Mr. S. G. Minkler, of Kendall county, reports as follows:

"We have another dry season, though rain enough to bring forth crops, except potatoes; the ground has not been thoroughly wet for three years; each fall has been

too dry to transplant trees, or to carry them safely through the winter, in the nursery and orchard. We ought not to complain, for we have a partial crop of fruits and cereals.

"*Strawberries* were a light crop, on account of the drouth; *Cherries* were good in quality—not stung by the Curculio; *Gooseberries* were a good crop; *Currants* a very light crop; the *Pear* crop did not amount to much, as trees which were left by the hard winter were blighted badly; *Apples* were an exceedingly light crop, and badly infested with Codling moth; there were not a hundred bushels this year where there were a thousand last year.

"Prices of apples have ranged as follows: Earliest $1.25, Fall 50 cents, Late Fall 75 cents, Winter $1.00 per bushel, in November; they will probably bring $1.25 this winter. Cider is worth 25 cents per gallon.

"Nursery stock was much injured by the winter, or some other cause—probably the excessive dryness of the soil, together with hard freezing."

Hon. Elmer Baldwin, of La Salle county, says:

"Apple trees, one and two years old in the nursery, are much injured in the top, many being killed nearly to the ground, while the roots were uninjured. Trees three or four years old were apparently uninjured, but where transplanted did not grow well—indicating a weakened vitality—and trees one year transplanted were mostly killed; the Stark suffering more than any other variety.

"Many orchard trees were late in coming into leaf—some of these maintaining a sickly appearance through the season, while a large portion thus affected died outright. The number affected was not large, but embraced a few in nearly every orchard.

"The *Apple* crop was almost an entire failure, especially in old orchards; those that had been bearing from three to five years did much the best. There was considerable bloom, but the blossoms seemed imperfect, most of them failed to set fruit, and the few germs that formed soon fell off or produced a few specimens of small, imperfect fruit. Maiden's Blush, Ben Davis, Willow Twig, and in some orchards Domine, did the best; in fact, but few other varieties produced any fruit of value. Ben Davis was the most productive of any sort.

"*Pears* were not as much injured as apples, and in some instances produced a fair crop of fruit.

"Of *Grapes*, the Concord vines left on the trellis, entirely unprotected, were not injured in the least, but have produced a full crop. Catawba, Delaware, and most other varieties of vines left exposed, were killed to the ground; but my old Delawares have made a splendid growth from the ground, and are much improved by the killing. I expect a full crop from them next year.

"Kittatinny *Blackberry* was mostly killed; Doolittle, Miami, Purple Cane and Philadelphia *Raspberries* stood the winter well and gave good crops.

"The effect generally on shrubs and plants was such as severe cold usually produces—killing the tops only. But severe cold was not the primary cause of damage to the apple orchards. Three successive seasons of drought, with two heavy crops of fruit in succession, had so reduced the vitality of the trees as to account for failure of the fruit crop and all the injury done; I am more fully convinced than ever that extreme drought, so common in our climate, is the greatest enemy to the fruit culturist. It is, doubtless, true that the severe cold of such a winter as the last, following excessive drought, will double the injury already done; but such a season of cold following a reasonably wet season will do but little comparative injury—always excepting cases of second growth late in the season, which must ever be followed by disastrous results; and these can be prevented by so protecting from drought by mulching or thorough culture as to prevent a suspension of growth the last of summer; as a second growth and swelling of the buds never occurs till after a season of rest. Orchards fully exposed to the prairie winds, and occupying northern or western slopes, have fared no worse the past season than those protected by timber belts; but those several years in grass, especially blue grass, suffered much more than others.

"Encouraged by two good fruit crops in succession, the people of La Salle county have made good progress in setting out orchards, small fruit, shade and ornamental

trees and shrubs, and in the progress of horticulture generally will compare favorably with an average of the State. But I regret to say we have no local horticultural society, and our county agricultural society, which has a horticultural department, is in a languishing condition—and what life it has has an absorbing taste for *horse flesh*."

In regard to other portions of the district I am unable to give any report, from the fact that correspondents failed to report to me. I will now give a brief report of my own county (Will):

Apples were very scarce and badly injured by the Codling moth—Maiden's Blush, Willow, Fameuse and Stannard producing the most; *Pears*—a good crop of Flemish Beauty and Bell Lucrative; *Cherries*—Early May and Late Richmond, a fourth of a crop; of *Grapes*, the Concord and Clinton bore a full crop; *Gooseberries*—a good crop; *Currants*—half a crop, except White Grape, which bore a full crop; *Raspberries*—Doolittle and Miami bore a good crop; Philadelphia, Thornless and Purple Cane, half a crop; Kittatinny *Blackberries* were killed to the ground; *Strawberries*—a light crop, on account of the drought.

Apple orchards were badly injured by the cold winter; trees of nearly all the varieties, in some orchards, being killed outright, while others, badly injured, lived through the season, but their vitality is so impaired they will, I fear, not survive another season—as was the case in 1856. *Pear* trees in orchards, except Flemish Beauty, were badly injured; Seckle, mostly killed, notwithstanding its hardiness heretofore. Early May and Late Richmond *Cherries*, though slightly discolored in wood, passed the winter safely. In the nursery, four year old trees of all the varieties of the apple with me were badly injured — Jonathan, White Pippin, Keswick Codlin, Golden Sweet, Grimes' Golden, Northern Spy, Maiden's Blush, Smith's Cider, and Stannard, injured the most, and many of each of the varieties named were killed down to the ground. Two and three years old trees the same. I had about forty thousand one year olds; about the middle of May I cut them off at the ground; the roots appeared uninjured, but not one in a hundred sprouted, but all died. I cut off, for an experiment, a few two year old Ben Davis, Willow and Roman stems at the ground, and all failed to grow. The injury to fruit trees the past season presents some strange features; of the same varieties standing in the same nursery rows, you will find those in which the injury is slight, while many are badly injured or killed to the ground; and this state of things is not confined to any particular varieties, whether they be the so-called "Iron-clads" or the more tender ones. On low land the injury to trees appears greater than on high, rolling land; also greater on new, rich land. All fruit trees that I examined in spring were badly discolored in wood, and have all remained so, making a moderate growth the past summer.

Pear trees in nursery were much injured; those that were not entirely killed, and were cut back, have made a good growth.

Cherry trees from one to three years old, of Early May and Late Richmond on Morello stocks, were uninjured, while the same varieties on Mahaleb, one year old, nearly all root, killed, while the tops were uninjured.

Grapes—Delaware, Hartford Prolific, Diana and most other sorts killed to the ground, unless protected; Concord and Clinton were uninjured.

Peach trees were partially killed. I had a hundred or more two year old peach seedlings in nursery; last fall I trenched down on each side of the row, taking away a large portion of the roots to graft the Wild Goose plum on; these were but slightly injured, while about one or two rods at the end of the row were not trenched, and they were nearly all killed to the ground.

I had a few two years old Orange Quince standing in nursery, that in spring were not in the least injured; with me, heretofore, they have almost always, when left out during the winter, unprotected, been killed badly.

Hope that some of our old and experienced horticulturists will be able to explain and give the reason why some of our heretofore hardy varieties of fruits are so injured, while many of the tender sorts are comparatively uninjured. I have examined many orchards in my own county protected by timber and timber belts, and found them fully as much injured as those standing without protection on the bleak prairie.

The great injury done to fruit and fruit trees the past winter—almost a failure of the larger fruits—combined with a short crop of the cereals and the general panic, has made the fruit-growers' road a hard one to travel; but, notwithstanding all these drawbacks, it is with pleasure I have to report an increasing desire among the horticulturists, farmers and others in the first district to plant fruit and ornamental trees, and many have, the past year, commenced to plant evergreens, and ornamental and deciduous trees on the prairie, for shade, timber and wind breaks, which I hope will be continued until every farm and orchard will be protected by screens of evergreens and timber belts.

L. Woodard, of Marengo, McHenry county, reports as follows:

"*Mr. President and Gentlemen of the State Horticultural Society:*

"Having been appointed correspondent to the 'Illinois State Horticultural Society' for the county of McHenry, and informed by your Secretary to make such reports as are appropriate, I will, therefore, endeavor to briefly give a report of the progress of Horticulture in our section.

"I would first state that it is with pleasure that I have noted the increasing interest manifested by farmers and others in planting fruit and ornamental trees. In so doing they are not only enhancing the value of their own lands, but beautifying the face of the country, and preparing a legacy for future generations. In showing up the matter in question, you will excuse me if I relate some of my own experience.

"Late in the fall of 1851 I removed from Syracuse, N. Y., and took up my abode in Marengo, where I commenced the nursery business in a small way. My means being somewhat limited, it was six or seven years before I began to think of setting an orchard. For this purpose I cleared off a grove of young timber, and set out about six hundred apple trees.

"The soil is a sandy loam, with some gravel and a very little clay. The subsoil (two feet below) is gravel and clay.

"The Red Astrachan, Sops of Wine and Duchess of Oldenburgh have paid a very good profit, the latter being the most profitable variety of its season, ripening in the

month of August. The Fameuse, Fall Orange, Lowell and Maiden's Blush have, generally, paid very well for fall apples. The Ben Davis has paid better than most of the winter varieties; it is second or third rate in flavor, but its keeping qualities are superior to most other varieties in our section. The Willow, Rawles' Janet and Jonathan have also been successful.

"This orchard has been cultivated yearly since it was set. The past hard winter tried it very severely, but only killed four trees, of the following varieties: one Early Harvest, one Domine, and two Winter Swaar. All three varieties are considered half hardy in this climate. With this exception the orchard looks well, and bore nearly one-third of a crop the past season, which is about the average in this section.

"Having a general supervision of quite a number of commercial orchards in this and adjoining counties, I find that in a short distance, with a different soil and location, the fruit varies in size and quality. There is an orchard near Woodstock, in our county, owned by G. W. Bently and others, that was planted some eight or ten years since. Said orchard is situated on a high bluff, sloping to the west and north; the soil is a sandy clay loam, with coarse gravel and considerable limestone. The trees came into bearing young, with a thrifty, healthy appearance; the fruit is very fair, and each variety of apples is larger than usually grown upon level ground or upon our rich prairie soil. This orchard is also kept under good cultivation. The Ben Davis, Willow, Jonathan, and Rawles' Janet are doing well, and, in fact, the greater part of it seems to be an exception and a very good locality for this county. It has suffered but very little from the past winter.

"Another orchard of five hundred trees, owned by C. Dole, at Crystal Lake, eight miles further east, situated upon level ground, near a small body of water, with a soil of sand and loam without much clay, produces smaller fruit than usual, although the orchard has not had a fair chance, as it has been seeded with clover for the past two years. With the drought we have had, and the past hard winter, the trees have been checked in growth and the fruit in size. I advised Mr. Dole to plow and cultivate this orchard.

"We are becoming quite conversant with most of the orchards of note in this county. Upon close examination we also found a number of old trees that were entirely dead, most of them dying from freezing of the roots in dry, uncultivated soil; and perhaps there may be a few half hardy trees killed by late and thorough cultivation—forcing the growth late in the fall, and leaving them in an unripe condition. We also examined several orchards in Kane and the north part of DuPage counties, in a stiff clay loam, with clay subsoil. Found the Stannard, Bethlemite (or Baltimore), and Keswick Codlin flourishing finely, but bearing small crops this year, the trees being a little checked by the past winter.

"Shrubs and vines were injured and many killed, as in the year 1869, by the roots freezing in dry soil, the tops being without proper covering in the fall and winter, and, in many cases, without sufficient cultivation during the previous summer. But I would say to horticulturists to watch the laws that govern the vegetable kingdom, as we know that the roots of trees, plants and vines cannot live when frozen in dry earth; even seeds of most kinds will not survive when frozen in dry soil or without any moisture.

"In reply to the suggestions of your Secretary as to the influence of groves and belts of timber adjoining orchards, I would say, I find, during the past twenty years, that groves or belts of timber have been quite injurious to orchards, especially on the east side, if near enough to shade the orchard in the forenoon; and, in fact, I would prefer not to have an orchard planted in a sheltered location, or surrounded by timber, but would advise planting on northern or northwestern slopes, or out on the open prairie, and let them have all the fall winds, in order to ripen the wood and prepare the trees for the setting in of our cold winters, and for the most severe changes of the weather. I consider the above mode safer than any protection or sheltered places."

TREASURER'S REPORT.

The Treasurer of the Society was called upon for his report, which he presented, as follows:

Statement of the Treasurer of the Illinois State Horticultural Society, for the year, from Dec. 10th, 1872, to Dec. 9th, 1873.

RECEIPTS.

Balance in hand, as per statement, Dec. 10, 1872	$1,010 34
Membership fees for 1872–1873	87 00
Donation from the State	2,000 00
Total	$3,097 34

EXPENDITURES.

Paid on warrants, as follows:

Dec. 20, 1872,	Reade, Brewster & Co.—printing	$ 24 00
" 20, "	O. B. Galusha—expenses as Secretary	54 62
Feb. 17, 1873,	O. L. Barler—reporting discussions of meeting,	125 00
March 4, "	Reade, Brewster & Co.—advance on publishing,	500 00
April 8, "	C. F. Brewster—on publish'g transactions, 1872,	200 00
" 12, "	C. E. Southard—printing reorganization bills,	6 00
" 12, "	C. F. Brewster—on printing transactions, 1872,	200 00
May 1, "	" " " "	200 00
" 26, "	Ottaway, Brown & Colbert—print'g transactions	79 11
" 26, "	Adams, Blackmer & Lyon—binding 1,108 copies transactions	247 96
Aug. 25, "	O. B. Galusha—on account of salary (½)	150 00
Dec. 1, "	C. F. Brewster—printing R. Y. certificates, etc.	8 50
" 2, "	O. B. Galusha—half salary (balance)	150 00
Whole amount paid on warrants		$1,945 19
Balance in the treasury		$1,152 15

JONATHAN HUGGINS, *Treasurer.*

WOODBURN, Macoupin Co., Ill., Dec. 8, 1873.

On motion of Mr. Humphrey, the report was received.

M. L. DUNLAP, President of the Society, having arrived and taken the chair, Hon. J. O. Cunningham, President of the Champaign County Horticultural Society, addressed him, as follows:

Mr. President: Your Society meets here to-day upon the invitation of the Horticultural Society of Champaign County, and that Society has desired me to welcome you to this city. On behalf of the Society and of the people of this city, I take pleasure in introducing to you Dr. Gregory, as my substitute in that pleasing duty.

ADDRESS OF WELCOME.

DR. J. M. GREGORY, Regent of the Illinois Industrial University, then spoke as follows:

Mr. President and Gentlemen of the Horticultural Society of Illinois:

It is with some reluctance that I step into the shoes of a gentleman so large, in every way, as the gentleman who has taken his seat after introducing me to you; and yet I do not know that he has any more largeness of heart to welcome you than I feel—just at this moment, at least. I know I may speak to you not only as friends, but from what I know of the Horticultural Society, and from what I know of the citizens of Champaign, and the welcome you will receive here, and the pleasure and advantage which will flow from your company—the pleasure they will derive from listening to your papers and debates, and from participating in the meeting you are holding, I can bid you a hearty welcome.

Why, in the very name of your Society—"Horticultural"—there is something that attracts—there is the fragrance of flowers about it—there is the savor of luscious fruits in it—a hint of homes surrounded by pleasant shade trees and beautiful grounds, carefully cultivated by the gardener, and every thing to make home lovely, attractive and beautiful. There is a hint of the winter evenings, and the fruits of that joy which a happy home gives. There is a hint of the summer days—of the spring-time—and the autumn fruits—in fact, of every thing that is best in our nature. The horticulturist, who takes care of our fruits, and beautifies our home, is welcome everywhere, but especially welcome in this new community—this new country—where the ripe fruits and the cultivated flowers have only just begun to bloom amid the wilder products of the prairie.

And then, gentlemen, I recollect that you come not simply as representatives of Horticulture, but as representatives of the Horticultural Society of Illinois, and therefore participants in that loving pride with which we are wont to regard our own great State; not merely as representatives of all those who have linked themselves together, in organized bonds, to promote the interests of Horticulture throughout the length and breadth of all our one hundred and two counties, but of those who desire to assist in the promotion of this enterprise, and these interests, that do so much for the promotion of the comfort of our home life, and for the promotion of the blessings of that civilization which we all desire to see growing upon these prairies.

Your published reports tell us of the market garden and the market orchard, and of the products that will sell in the market, the price they will bring, and the numerous appliances that will aid the laborer in his toil. But, gentlemen, many of you recognize that above all this—above the mere value of a thing in the market, or what it can be sold for in the shambles—there is a whole segment of our hearts—a whole section of our nature—that lies in the realm of the beautiful and good; and while you are thus laboring in all departments of Agriculture, for money or for whatever purpose, yet you are not forgetful of other interests. You seek to add to these objects those higher and purer things, and these give to man those refinements that are due to man's intellectual, higher and finer nature.

We recognize these as among the fundamental aims and purposes of the State Horticultural Society. With such aims, with such purposes—with the redolence of flowers about you, and with the fragrance of ripened fruits, you come to us, and this county extends to you a hearty and warm greeting. Why, gentlemen, as you came it seemed as though the atmosphere itself knew of your coming. It was cold only a few hours ago, and it changed and became as summer time, and now the breath of the air about us is as if the buds were beginning to open in the spring. I should not wonder at all to see some of them bloom before the end of your session. [Applause.] And, gentlemen, while welcoming you on behalf of the County Horticultural Society, I also do it in the name of all the ladies, gentlemen and children of this community, as well as of those students of the University whom you have seen here this morning. Some of them come here to greet you this morning, but you will find them all here before you get through with your session. This same breath of warm air that you sent before you has, perhaps, done its work in keeping some away, because it has thawed out the mud.

But to-day I welcome you not only in behalf of the Horticultural Society, but in behalf of the institution over which I preside, which welcomes you here to its halls. It is with great pleasure we have thrown open these rooms, and your presence here is doubly welcome because your purposes are akin to our purposes. You draw at the ropes, we push at the wheels, and there are those who work hard among us to push forward your grand enterprise for the good of mankind. Both the University and this Society are trying to do what we can for the good of mankind, for the advance of civilization, and for the training of mankind to a sense of higher things.

This institution is of great interest to you. I know that though you may have attended to the strict business before you in your several sessions, yet the interests of this institution have been at your hearts; members of this association have cherished our institution ever since its commencement. We have had Presidents of the Society, and members, who belonged to our Board of Trustees, and one of those Presidents has sons who are students in these halls to-day. There is one at least, if not more, of the sons of your former President, a most influential man. They were good boys, and did credit to the father and mother who gave them birth and reared them.

In all this work that we have been seeking to do, we have been aware, at all times, that however there might have been misunderstandings on your part that led us to misunderstand you, yet at heart we were substantially, steadily, and with all our strength, moving on to the same purpose that you have in view. And, gentlemen, I believe that the more you know of us, the better you will like us. You will not take it as an expression of vanity if I say this. We have nothing to fear from the outside. We have steadily invited our critics and our friends to come and see after these things—whether their Industrial College was what it ought to be—whether it was doing the work it ought to do. You have been aware of the difficulties under which the work has been accomplished, and yet steadily through them all there has come a gleam of hope, brightening from the fact that we are in a State where agriculture—the largely predominating industry—has not only its farmers, but its horticulturists. I could forgive Connecticut, with her poor soil and limited area, for failing in an agricultural college, if it did not do very much in the way of educating agricultural students. I could not forgive the institution in the State of Illinois which should fail in accomplishing this purpose, where agriculture lies written in characters as deep as its soil and as broad as its prairies. Such are the hopes with which we have

labored—and we feel glad, and come here to-day in full confidence that when you come to understand the difficulties under which we have labored, and the success which we have attained, you will be glad to have come with us, and to see that we have been enabled thus to fling abroad our banner to the breeze without a single cloud or difficulty in our way; and although there may be long turns and trials, and some sharp criticism, yet we are confident we are so far up the hill that the top is in sight, and we shall speedily be there. And, gentlemen, you will be glad of such a

We shall welcome you, not only to the hall which you now occupy, but we will welcome you to-morrow to come and witness the assembly of the students of this institution, numbering some four hundred, although the panic has driven some of them home—some are home by sickness—but we fall not very far short of this number. You will be glad to find that this is the best agricultural college—having the best agricultural library—the best in its material—of any on the American continent. [Applause.

We shall welcome you to the various exercises of the University. Make yourselves at home—go into our rooms—look in upon the classes at their recitations—upon the boys and upon the girls. You will find them good-looking, courteous, cheerful, earnest, devoted and hard at work. I do not know, to-day, that they can show more at any place. Then look in upon that branch established by the grant of Congress—in the engineers', architects' or mechanics' departments. We shall be glad to see you everywhere, and wherever you go you will be welcome, and you will leave among us the fragrance that you have brought. You will leave among us pleasant memories, and I trust you will carry with you pleasant memories, and that you will hereafter be encouraged to do more and more for the cause in which you have labored in the past.

The President—I take a great deal of pleasure in returning the thanks o the Society to Dr. Gregory for his kindness. I have no doubt that you will be all pleased with your journey here, and find a great deal to interest you. I will call your attention to the large experimental orchard connected with the University. I look upon it with a great deal of pleasure. ou can find here a great deal that will save you individual labor and individual expense.

Dr. Gregory—I ought, at the time, to have made an apology for myself, and for the young men and ladies, for having come in and gone out of the room so frequently. They have come whenever they were at

liberty from their classes, and when they have left, to go to some other class. I hope it will not be considered a lack of courtesy or interest on their part.

The PRESIDENT spoke as follows:

Seventeen years ago this month, a few—not a dozen persons—met by appointment at Decatur, to organize the Illinois State Horticultural Society. The wisdom that dictated that movement has long since been apparent. Then there were but a few small commercial orchards, and market gardening was in its infancy. We were entering on our first experiments, and settlement had just begun to show its effect on our climate; while our insect foes, that we now have to battle, had not begun a serious warfare on orchard and garden.

Those seventeen years have been fruitful of progress, and to-day the orchards, the vineyards, and the market gardens of the State occupy many thousand acres; and many square miles of river bluff, of rolling prairie, and woodland hillside, are made resplendent with horticultural riches.

As the years have come and gone, some of that band of workers and organizers—men who put their hands to the early work—have laid down to their final rest. But new workers have come into the field, and the good work will go on long after all of us shall have gone to our last home. It is well that the good work shall continue, for Horticulture is the handmaid of Agriculture, and refines and adds to the enjoyments of life.

In all periods man has had to labor. Even Adam, when placed in the midst of Eden, was commanded to dress and to keep it. But, under the new arrangement that soon followed, there were new duties imposed, and new enemies to encounter, all of which we now most fully comprehend. The summer's heat and the winter's cold must be modified by culture, by shelter, and by the shears and the pruning knife.

At first this Society gave its efforts to the orchard and the garden; but soon there came a demand for forests, and forestry and hedge-growing were added to the list of our active duties. Then the railroads have made a new demand on us for the ties that form the road-bed, the timber for culverts, for cars, and for fence posts.

How best to provide for all of these new and old demands is the object of these annual gatherings, that call you from your homes in order that you may plan the work for its better progress. Much has been accomplished, but more has to be done. The varied changes of the seasons, the unequal alternations of wet and dry, the uncertain attacks

of the insect tribes, the forays of birds, and the irregular growth of plants, have all to be taken into the account, and, as far as possible, to be mitigated and amended. Thus Horticulture has become an important part of rural labor, and one that requires special training and special management in order to be most successful, and yet its subdivision may be added to ordinary farming, as the orchard is part of the farm, though the farm-orchard is not expected to furnish a large surplus for the demands of the market. Then the small fruits may become a part of the business of the market or suburban gardens, or even of the farms; while flowers, from the modest forget-me-not to the giant denizens of the forest, should form a part of every rural home.

To you is confided this important trust, and upon its faithful fulfillment will depend much of the wealth, the pleasure, and the enjoyment of the homes of the people of the State.

DISCUSSION ON REPORT OF VICE-PRESIDENT FOR THE FIRST DISTRICT.

Mr. Minkler—I could not let that report go as the expression of the views of this society, in regard to non-sheltering and leaving all our fruit trees exposed to the elements—to take care of themselves—for the purpose of making them hardy. I cannot see the point. No doubt those in close proximity and near to a row of trees may be injured, for the reason that it will draw moisture from the roots; but what is lost there, in my view, is gained by further protection of the orchard inside of that; so that I think there is no loss, but gain, and I am sorry that Mr. Woodard has set that forth, to have us abandon the idea of sheltering our orchards. I want to see the whole country sheltered. I would be glad to see evergreens planted on every line and cross fence, for the protection of our crops, ameliorating our climate, and increasing the beauty of our country. Tree planting is in its infancy. Forty years ago, where there was not a tree or a leaf to be seen, now so much has been planted in the northern part of this State that it looks as though it had been a timber country from the beginning. Some of the timber has even been taken to the saw-mill, that has been planted since I came here. To say now that we don't want forests and shelter belts is not true, in my opinion, and I want to enter my protest against it.

Mr. Humphrey—Certain facts, during the last year, appear to have been unprecedented; we observe certain things in certain localities that we have not observed before. Our reports must be taken in a general sense, as applying to special localities. No doubt, as this gentleman

observes, orchards that are well sheltered have been injured as much as those on the open plain. There are certain facts that appear in connection with this.' Many times we plant orchards on low ground, and surround them by belts of timber. These tracts are quite wet, and the very cold weather may injure these trees ten times as bad as it does those that are on a high, dry, piece of ground. Take into account the moisture in the soil, and these facts can be accounted for; so that in the main I do not think it is intended, in any of these reports, that timber belts are not desirable. I think we shall see that it is a generally received opinion that these protections are necessary, and are really desirable in the protection of our agricultural interests, especially for the retaining of moisture in the ground, and to prevent droughts.

MR. SNEDECKER—I don't think these reports can be relied on at all times. There has been, for the last few years, a great drought throughout the whole country, and the last winter has been more severe than usual. Certain localities have been better circumstanced than others in regard to shelter. I have seen, in the timber lands, where it was generally supposed the trees were doing the best—where they were sheltered, and to all appearances were doing the best, these trees suffered the most—cherries, apples and pears. That seems to be a contradiction to what we generally supposed. We generally supposed that shelter has been a benefit. On the wide, expansive prairie—deep black soil—no trees around that could be of any benefit—I saw an orchard, this year, with the best crop, the handsomest apples that I have seen this year. I do not know how to account for it, unless it is from the moisture that has been in the soil, furnishing the necessary food for the trees.

MR. HUMPHREY—Was the orchard cultivated?

MR. SNEDECKER—No, sir.

MR. HUMPHREY—What kind of grass was it?

MR. SNEDECKER—It is mixed up with oats and blue grass—not much grass. It is a pretty thick orchard, and the grass does not grow much.

MR. HUMPHREY—Was it a young orchard?

MR. SNEDECKER—No; an orchard about twelve years old. Well, sir, I know another orchard of about twenty acres, three miles from a river, planted on cleared timber land, which has no protection at all, and yet has produced, this year, a good half crop; the apples sold for a higher price in the market than others, and the owner told me there was no piece of land that he had that had done so well this year. He sold apples for market to the amount of $600 cash, and besides, had the wind-

falls and poorer apples for other uses. This was about $1.75 per barrel in the orchard. I can account for this only from the moisture in the soil. The two instances seem to contradict each other, but nature is always true, and we have no doubt that it will prove so here.

Mr. Galusha—Perhaps it would be well to call the attention of members to the fact that there is a time set for discussion upon the "causes of the failure of the fruit crop of 1873." That subject was postponed until all the reports of the Vice-Presidents had been read. This was so arranged because of the importance of a thorough investigation of this subject, and of the great difficulties that attend such investigation. We need to be very careful in this matter. Before we advance our theories, we should have the reports of all the Vice-Presidents in, to tell us the situation in all parts of the State, and then we can discuss this subject understandingly.

This matter, introduced by Mr. Minkler, of protection to orchards, it seems to me was very intelligently discussed at our last annual meeting, and those who have the report will see the prevailing opinion. It is, that prairie and timber interspersed are more desirable for orchards than either open, naked, bleak places, or closely sheltered places; that we need to break the force of the winds, and to ameliorate the climate also. *That,* I believe, is the prevailing opinion of the society in regard to protection. We have found that an orchard walled in on all sides by trees closely planted is decidedly inferior, on account of too close confinement, inducing mildew on the trees and preventing the ripening of the fruit; full ripening can only take place where there is free circulation of light and air.

Mr. H. J. Dunlap—I move that we now adjourn until half past one o'clock this afternoon.

Mr. Burrill stated that the citizens had made arrangements to entertain the members of the society at their residences, and after adjournment would assign gentlemen to their temporary quarters. He also stated that he had made special arrangements with the hotels for reduced rates for such members as preferred staying there.

The President announced that the Treasurer would attend to the duties of his office immediately on adjournment.

The Secretary announced that the railroads would grant return tickets at the following rates: C., A. & St. L. R. R. at one-fifth fare; I. C. R. R. at one-fifth fare; I., B. & W. R. R., free, and that certificates for this purpose could be had from the Treasurer.

The motion to adjourn was then put and carried.

FIRST DAY.

AFTERNOON SESSION.

The meeting was called to order at half past one o'clock, pursuant to adjournment.

PRESIDENT'S ANNUAL ADDRESS.

M. L. DUNLAP, the President of the Society, read his Annual Address, as follows:

After the experience of another season, we have met to take counsel together.

The unusual drought of the past three years has given us some new conditions to be considered, and, if possible, to be corrected. Formerly we had been taxed with a surplus of rainfall, that called for drainage, and now we have the very reverse. The wet feet that occasioned so much of our attention have became dry feet; and that excess of dryness, like the excess of wet, has led to death in the orchard, the vineyard, and on the lawn.

We must not speculate on the cause of the changes in the progress of the season, but may look to the effect, and inquire for a remedy. Fortunately, the plan for the cure of the one is also a cure for the other. Deep tillage and a friable condition of the soil is essential to both conditions. In one case the rainfall may pass off through the soil, and in the other it may arise by capillary attraction.

The dead trees are now past remedy, but the lesson should be of value hereafter in the case of trees, and vines, and shrubs.

The abundant crop of 1872 also weakened the vitality of the orchards, and aided, to some extent, in their destruction; and at this time there is every indication that the same result is to follow, and we shall need to guard the orchard during the coming year from an over-crop, unless the late frost shall do the work for us. We are largely indebted to Dr. Hull for valuable lessons in the thinning of fruit, and I respectfully call attention to his teaching, not only for the peach, the pear, and the cherry, but for that most valuable of all fruit, the apple.

There is a demand for a superior article of cider, and there is no reason why our orchardists should be behind those of New Jersey in furnishing it. The samples here shown prove that this may be accomplished. This will add greatly to the value of the apple-orchard.

We need more thorough lessons in the making of cider-vinegar, and the manner of putting it in the market. Age and careful racking-off before shipping are the essentials to this end, and their observance should be regarded by all, and ought to nearly double the value of the orchard in the making of this product.

We must ask our Legislature to pass a law to protect people from injury by the adulteration of food, including fluids for food and medicine. Other countries are in this respect careful of the health of the people, while here there is no protection against this class of wrongs, and it has now come to be a crying evil that must command attention.

We must also ask that all articles of a dry nature be sold by weigh instead of measure. This should apply to berries, eggs, and all products that are not really fluid.

The voting on the merits of our fruits has often had a tendency to mislead, and we should give weight to the experience of good cultivators, rather than to the votes of less-informed persons.

The experimental orchard of the Industrial University should now, to a large extent, take the place of individual effort, and its lessons should be of practical value. The orchardist, Mr. Vickroy, has the fullest confidence of this Society, and it is to be hoped that he will be retained in its charge. An application should be made to the Trustees for the free distribution of cions of such varieties as may prove of value, or give promise of such, in order to a wider test in all parts of the State. Such distribution should be to orchardists rather than to nurserymen. This experimental orchard was created at the expense of the State, and it should be used to further advance the value of the orchards of the State.

Forestry is making fair progress, and trees of a commercial value are being planted. At the head of this list is the European Larch, for ties, fence-posts, and similar uses; the Osage-Orange (in all the south half of the State), the Ash, Maples, Elm, Hickory, Walnut, and Willow. In the south part of the State the Osage is, perhaps, the most valuable for general use, and must take its place at the head of the list for supplies of wagon-timber.

It is now well understood that Osage hedges must be plashed at from six to eight years old, and afterward be kept in check by the shears. The simple cutting back and the let alone plans have not been a success.

The railroads have begun to appreciate the value of horticultural products as a feature in their earnings, and have given the subject of freights and handling more attention, in order to foster this department of their business; and yet there is room for further improvement.

Until fruit is sold by weight we shall make little progress in fruit packages. At present the study is to sell the least for the most money, and not how we may ship the most for the least money. Barrels, boxes and baskets are of an uncertain measure, and are sold by guess rather than by measure or by weight. The buyer says: "I guess that barrel holds two and a half bushels, and the other one three bushels." Weighing would cheapen the cost of the package, and lessen the freight, and be an advantage to both buyer and seller, and leave less opportunity for false returns of the commission men.

Your attention has been called to some of these subjects before; but they continue to press on our attention, and will do so until they shall be fully met and provided for.

The new management of the Industrial University calls for our earnest sympathies; and, so long as it endeavors to be of practical value to the great interest of horticulture, it should be encouraged. The day is past when a dissent from its management may be construed into a hostility to the duties that are imposed upon it. Its horticultural department, to a great extent, should supercede the necessity of private or individual investigation and experiment. Let its errors of the past be condoned by an honest, faithful endeavor in the future.

Tree planting, for the past three years, has been almost a failure, and both nurserymen and planters have become more or less discouraged; but we should now hope for a change in the seasons that shall give promise of better things in the future. For this reason we should begin anew the planting of trees that shall make our homes of more value in money, in health, in pleasure, and in social enjoyment.

SECRETARY'S REPORT.

O. B. Galusha, Secretary of the Society, presented and read his Report, as follows:

To the President and Members of the Illinois State Horticultural Society:

In the introduction to volume six of the Transactions of this Society, I mentioned one of the causes of delay in the publication of that volume; but there are circumstances connected with, and resulting from, the failure of the publishing house of Reade, Brewster & Co., which are necessary to be known, that you may have a full understanding of the action of your Secretary, and the position of the Society.

A contract, almost identical with those made for the publication of volumes four and five, was entered into between Reade, Brewster & Co. and myself, for the publication of volume six; one of the stipulations being the usual one of an advanced payment of five hundred dollars. This amount was paid by an order on the Treasurer of the Society, as our financial reports will show; but only sixty-four pages of the book had been printed when the firm went into bankruptcy. The proportionate value of the work done was about one hundred and sixty dollars, leaving the firm indebted to the Society three hundred and forty dollars. The affairs of the firm have not yet been settled, so that it is uncertain what percentage of its indebtedness will be paid.

As soon after the appointment of assignees as it could be effected, I secured, through the assistance of Mr. C. F. Brewster, the use of the type and presses of the late firm for a few weeks, and at once employed compositors, purchased materials, and the work on the book was resumed.

When the work was within about two weeks of completion, the creditors (assignees) gave orders to have the printing room closed. This, of course, compelled another change; and I soon arranged with the

house of Ottaway, Brown & Colbert to complete the job—retaining Mr. Brewster to take charge of the work.

The entire expense of publisbing volume six, including the binding in muslin of the whole edition, also the binding—uniform with this—of fifty copies each of volumes two and four, and forty copies of volume three, was $1,383.32, the items being as follows, viz:

Advanced to Reade, Brewster & Co	$500.00
Paid W. C. Clarke for paper	180.00
" for ink	6.25
" C. F. Brewster for services	175.00
" for assistance in reading of proof	21.00
" Compositors	144.00
" Ottaway, Brown & Colbert for printing	109.11
" Adams, Blackmer & Lyon for binding	247.96

It is known to the members of this Society that its reorganization as a "public corporation of the State" was not effected at the last session of the General Assembly, though almost unanimously agreed to in the Senate. I accordingly, under instructions of the President, issued, during the last summer, a circular letter and sent, with a copy of our report, to eyery member of the General Assembly. It is hoped that by thus calling the attention of our public servants to the work and the aims of this Society, they will not delay to call up our bills and enact them into laws. These bills were drawn up subsequent to our last annual meeting, by the Executive Board of the Society, in consultation with a committee appointed by the Northern Illinois Horticultural Society.

The Secretary here read copies of two bills; one, re-organizing the State Horticultural Society, and the other appropriating the sum of three thousand dollars per annum to be expended by it in advancing the interests of Horticulture and Arboriculture in the State.

EXPENDITURES.

I have expended during the year—as per bill of items herewith furnished, as follows:

For postage on letters and circulars	$ 30 42
" freight, expressage and postage on books	102 57
" traveling and printing expenses, including bills paid by me	58 35
" stationery and miscellaneous	11 15
" office rent, fuel and lights	30 00
Total	$232 49

RECEIPTS.

The following have been my receipts during the year (besides the regular salary of $300):

Draft on warrant, drawn to C. F. Brewster, being overplus drawn for publishing	$ 50 00	
For 22 books sold at $1.00	22 00	
" premium at State Fair	100 00	
" fruit sold at State Fair	3 40	
Total		$175 40
Balance due me on all accounts		$ 57 09

The following is a list of the warrants drawn upon the Treasurer since my last report:

Dec. 20, 1872, Reade, Brewster & Co.—printing circulars, etc.	$	24 00
" " " O. B. Galusha—balance on expenses, etc		54 62
Feb. 17, 1873, O. L. Barler—reporting		125 00
Mar. 4, " Reade, Brewster & Co.—advance on publish'g		500 00
Apr. 8, " C. F. Brewster—superintendent of publication		200 00
" 12, " C. E. Southard—printing reorganization bills		6 00
" " " C. F. Brewster—on publication		200 00
May 1, " " "		200 00
" 26, " Ottaway, Brown & Colbert—printing		79 11
" " " Adams, Blackmer & Lyon—binding		247 96
Aug. 25, 1873, O. B. Galusha—half of salary		150 00
Dec. 1, " C. F. Brewster—printing circulars, etc		8 50
" 2, " O. B. Galusha—balance of salary		150 00
Total		$1,945 19

Respectfully submitted,

O. B. GALUSHA, *Secretary.*

MORRIS, GRUNDY CO., ILL., Dec. 8th, 1873.

In response to a request from a member of the Society present, the Secretary gave in further detail the steps taken, prices paid, etc., in procuring the completion of the publication of the last volume of Reports; also gave a statement of his efforts to procure the passage of the bills referred to in the report. He said the bill to reorganize the Society

passed the Senate with only two negative votes; and when he left Springfield the second time, it was in the hands of the Agricultural Committee, a member of which assured him that the Committee would recommend its passage, and that it would pass the House of Representatives, as it did the Senate, with very little, if any, opposition. It was, however, laid upon the table of the House by a very small vote. He believed that if the members of the Society were faithful in presenting the situation of the Society, its general aims and its relations to the State Board of Agriculture as its principal adjunct in carrying on the most difficult part of its work—a part which the officers of that Board themselves admit cannot be successfully performed without such an ally—their several representatives would not hesitate to give pledges of their votes in favor of these bills.

MR. MINKLER—I desire to have this meeting express its sense of the way in which the Secretary has managed our affairs relative to printing.

THE PRESIDENT—I would remark that the thanks of this Society are certainly due to Mr. Galusha for his unwearied efforts and success in the printing arrangement.

MR. MINKLER—We, as a Horticultural Society, assisted him in getting up a display of fruits for the State fair, and through his efforts we obtained the premium of one hundred dollars. We know that his salary is no adequate compensation for the amount of work he has done; therefore, I move that the amount of one hundred dollars be added to his salary for the current year, in consideration of an extra amount of services rendered.

DR. HUMPHREY sustained the motion, and it was unanimously adopted.

MR. GALUSHA—I sincerely thank you for this vote, and I can only say, I have done that which I thought was my duty to do. I certainly can congratulate the Society upon so favorable a termination of our late troubles. I acted with the knowledge and by the advice of the President. There seemed to be no other course than to shoulder the burden and go ahead.

LETTERS FROM ABSENT MEMBERS.

The Secretary read letters from Prof. J. B. Turner, Hon. Lewis Ellsworth, Dr. Wm. LeBaron (State Etomologist), Parker Earle, Maj. J. R. Muhlemann, Hon. A. M. Brown and Dr. E. S. Hull, all expressing regret at their unavoidable detention from the meeting, and their good wishes for a pleasant meeting and the continued usefulness of the Society.

Mr. Ellsworth's letter contained a recommendation that the Society send a delegate to Springfield this winter to secure the passage of the bills of this Society by the General Assembly.

REPORT OF COMMITTEE ON ORCHARD CULTURE.

The Secretary stated that the members of this committee were not present, and that but one of them had forwarded a report. He then read the following from Dr. L. S. Pennington, of Whiteside county:

STERLING, ILL., Dec. 1, 1873.

O. B. Galusha, Secretary Illinois Horticultural Society:

FRIEND:—I regret exceedingly my inability to attend the coming annual meeting of our Society—to look again on those old familiar faces, and listen to their deliberations.

With the Committee on Orchard Culture I regret that I cannot make a more full report of this section of our State—Northern Illinois.

To the orchardist the winter of 1872 and 1873 will long be remembered for its great severity, and the following summer for its almost unprecedented drought; as a consequence, the nearly entire failure of our fruit crop.

The subject of Orchard Culture is one embracing such a variety of topics that one scarcely knows where to begin in order to present some new feature that may be of interest. I should fear to speak of it in any of its phases, were it not that almost every year develops some new feature not before known.

The introduction of new varieties, their acclimation, the change of our seasons, and the rapid increase of destructive insects—all these require from the horticulturist eternal vigilance.

Among the early planters in the State, I still feel that it requires greater watchfulness and a deeper research to master many of the every day problems presented for our consideration in this calling.

In this connection I will mention some of the requisites for a more successful orchard culture. It has often and as truly been said that an orchard, to succeed, must be planted on land well elevated and on a soil, if not by nature, by art, well drained.

It is a question how far shelter belts can be made to protect from the frosts of spring or from the cold of winter. My experience is, that trees planted for this purpose alone are of questionable utility.

I have found that elevated and northern declivities are points more desirable for fruit culture. The recollection is still fresh in my mind of having seen, when traveling over this county (Whiteside), prior to 1855-6, the more tender fruits, such as the peach, in full bloom on the most bleak and what would seem most unfriendly spot, while in places more level and sheltered not a blossom could be found.

I would in no wise discourage tree planting; I believe it should be encouraged both by the State and individuals. For our fruit-bearing

trees, however, we need the cold winds from the north and west, in order to preserve, so far as we can, their winter sleep undisturbed. In their normal condition they should approach, so far as possible, the sleep imposed upon many of the higher forms of life, as found in hibernating animals. It is not so much the degree of cold which destroys the life of plants as the sudden and frequent changes from heat to cold.

One of the means by which we may protect our orchards is a judicious system of mulching. This is especially called for in the protection of all tender varieties. Another means of preservation is seeding to grass; and from my experience I would recommend clover for that purpose. Both mulching and grass culture, however, attract and protect an enemy almost as fatal as the cold itself. I refer to the field mouse—insignificant, yet able to destroy many valuable trees. The careful orchardist will remove any accumulations directly in contact with the tree which might afford shelter for mice, and substitute, instead, earth or snow firmly compressed.

The orchard trees injured by the past winter, we find on a careful examination, were either killed or injured at the collar, or earth line; this condition of things, in my recollection, has not occurred since the cold winter of 1842–3, when, with this difference, they were then killed at the *snow* line.

There exists a peculiar feature of the winter of 1872–3, in that many trees heretofore considered hardy have suffered in common with the more tender varieties; I cannot account for this anomaly, except it be owing to a reduced vitality from overbearing, the extreme drought, and badly drained, unfavorable localities. I have not mentioned, in this connection, the very cold winter of 1855–6, which, in its injury to our trees, had little regard to lines.

We have much yet to learn respecting prairie orchards. How many of us keenly feel the mistakes early made in our pioneer planting, when the only knowledge gained was from books. That condition of things no longer exists. No reasonable excuse, at this day, can be offered either by the orchardist or nurseryman, for raising untried and unprofitable varieties.

How few planted at an early day are found worthy of cultivation. Some have promised well for a season, and yet, in the end, have failed in some particular. The Carolina Red June has become, within a few years, almost worthless in consequence of the scab; the Fulton is too tender and too shy a bearer to be profitable; the Ortley is both tender and scabby; the Yellow Bellflower has become so shy in bearing that it no longer pays as an orchard fruit. This is but a small list of the many that have become almost cumberers of the ground.

It pains me to see men bring forward so many new and untried varieties, for I know too well how much labor and capital will be lost, and how great will be the disappointment. No tree should be recommended for general cultivation until it has passed at least through one or more of our cold cycles or winters. I almost fear to give a list, however small, for the number having the requisites to make them profitable

appear to grow less almost every year. I will speak of a few that I can recommend, and if largely planted would feed the million:

The *Red Astrachan*, *Kirkbridge White*, (Yellow June?), *Duchess of Oldenberg*, *Hass*, (Maryland Queen?), *Soulard*, (Early Nonpariel and Early Nonesuch?), *Snow* (sometimes scabby), *Domine*, *Winesap*, *Willow Twig*, *Ben Davis*, *Gilpin and Tolman Sweet*. There are some others that promise well, but before recommending I would consider it safer to give them a further trial. This is truly a very small list, but by careful selection, both from home and abroad, it can, in time, be made to meet every want.

When the laws of hygiene are better understood, then will the use of fruits as a diet be more highly prized, and be considered a necessity at every board.

Whatever drawbacks and failures we may suffer, we cannot afford to turn back; our experience is growing every day, and we are gaining in new appliances by which Horticulture is becoming more and more of a success. Truly yours,

L. S. PENNINGTON.

Mr. Bailey—I would suggest that the report of Mr. Pennington be referred to the secretaries, and that so much as pertains to the varieties of the apple be put upon the blackboard for the benefit of the Society. It is, perhaps, a little out of the way, but many of us want to plant orchards next spring, and would therefore like to have put on the blackboard the list of apples recommended, so that when we come to plant we may avoid the bad and take the good.

This was acceeded to, and the Assistant Secretary put on the blackboard the list referred to.

The President—We are now through with the call for the afternoon. Any discussion is, of course, in order.

DISCUSSION ON ORCHARDS.

Dr. Humphrey—I do not wish to take up any time, as the question of the failure of the fruit crop for the year may come up under a special head. There is one subject mentioned in the report of the Committee on Orchard Culture, and one in the report of the Vice-President for the first district, to which I should like to call attention, and that is in reference to the success of orchards, vineyards, and trees in general upon these bleak places. There is a fact that we sometimes overlook. When a plant is protected by mulching, and is not subjected to freezing and thawing, it comes out right in the spring. Ground having a slope to the north freeze up early in the autumn, and does not thaw out until the spring, while a piece that is protected by a belt of timber is subjected to

this freezing and thawing. You secure the same thing by mulching, and by a grass plat, precisely that you secure on the northern declivity. It is freezing and thawing which destroys our plants, instead of the excessive freezing, as a rule, and that will account for the fact that this year, in many places, we have lost valuable trees where they seemed to be nicely protected, and it will lead us to the question of distribution of our plants, instead of hedging in our orchards and vineyards.

Mr. Minkler—I do not suppose that the practice of growing belts of trees around our orchards is a panacea for all the ills which fruit trees are subject to, and I think it had but little to do with our last year's experience. It is well known that in the northern part of the State we have had it exceedingly dry for three years. We have had no moisture in the subsoil, which is necessary to protect the roots of any tree in winter. I presume, if we had had moisture enough to penetrate our subsoil, the trees would have been all right. The roots froze up in so dry a soil that they could not get a supply of sap, and they died. Probably one cause was the exhaustion by overbearing the year previous—that is my view of the matter. The Early Richmond went to rest early—it did not draw so hard on the soil late in the season as others did, and hence it was not destroyed.

We have been talking about soils a great deal, but I tell you whenever the climate is right we have fruit, both North and South. It is not excessive freezing that kills the trees of the North. Twenty-eight years ago the thermometer at Mendota was 24° below zero, and the next season we had peaches. This shows that it is the condition the trees are in at the time, that destroys or preserves them. I have no doubt that if there had been sufficient moisture in the subsoil last fall they would have come out right. I do not think protection has much to do with it.

Mr. Hilliard—It is a question whether overbearing, and the extraordinary crop two years ago did not, in a measure, cause all our loss of apple trees this last winter. I am sure that my grape vines had borne so fully that this year they did not properly ripen their fruit, and it is a question with me whether apple trees did not fail from the same cause.

Dr. Mosier—I have had some little experience in the rearing of trees, and I would say that my trees are not yet in bearing. I have about 1,500 trees set five years ago; the balance, to make up 2,300, were set four years ago last spring. I have cultivated them in corn up to last year, planting two rows between the trees to partially pay me for cultivating. A portion of the ground had became so ridged up to the trees that last year I reversed my plowing, and instead of plowing to the trees

I plowed from them; and in that portion where I plowed from the trees, and made the ground comparatively level, my trees fared worse than any other trees in the orchard. It was a varied soil; the orchard extended across a ridge into low land on both sides. The trees on the low ground were worse than those on the high ground. Last year I trimmed most of the trees, and those that I trimmed suffered more than the others. I commenced in April and finished in October. Those that I trimmed in April the borers took hold of, and after that I do not think there was a single tree affected by borers.

Mr. Huggins—Which borers do you refer to?

Mr. Mosier—Those that work in the body of the tree.

Mr. Barler—Do you think the cutting caused the borers to work on the trees?

Mr. Mosier—I think it must have had something to do with it.

Mr. Huggins—Our friend Mosier, in speaking of his trees being injured by the borer, makes me feel the importance of using proper expressions. I know I fail in it—have failed in times past. The uninitiated do not know what we mean by "borer," as we know there is one borer that works on the body of the tree, and never on the root, and another that works at the collar, and sometimes a little higher up. We therefore ought to designate which borer it is. I suppose he meant the borer which works on the body. I don't think that cutting off the branches of a tree has any effect on the work of the borers.

Mr. Scofield—In my mind I am fully convinced it is no very difficult matter to arrive at the cause of the failure last season. In Stephenson county we made an early examination of the trees, and I was satisfied they were not injured in body or limb, but as the spring advanced the contrary was proved, and on examination of large orchard trees I found the roots in a condition as if they had lain out all winter, and had been exposed to freezing and thawing. Here is the cause of the death of many of our orchard trees. From these facts I was led to make a closer examination, and in almost all cases where I made a thorough examination I found that the damage was in the root—that the root was literally frozen. Two causes operated to produce the result, viz: the extreme drought of the last three years caused our subsoil to be so dry that a man might work it all day long without damaging the blacking of his boots; then our winter set in in November and continued until March or April, and as there was no moisture in the ground to maintain the vitality of the trees they died.

In my report I mentioned one orchard that had been used as a hog pasture, and all the trees except one, where the snow had drifted in were dead. There was no mulching—nothing to retain the moisture at the roots—and they all died. There was one orchard on a northern slope which was not injured, and in June or July, when I saw it, it had a good crop of fruit, and looked healthy and vigorous. These are the causes of the destruction of many of our orchard and nursery trees. I have examined them from the Mississippi to Lake Erie, and I find this same difficulty prevails.

A MEMBER—What was the temperature of your farm?

MR. SCOFIELD—The lowest was 28° below zero.

MR. FLAGG—Have you had any experience with the Golden Chinese Arbor Vitæ?

MR. SCOFIELD—I have not cultivated it here.

THE PRESIDENT then called for the

REPORT OF VICE-PRESIDENT FOR SECOND DISTRICT.

Mr. Edwards, Vice-President for the Second Horticultural District, being absent, sent his report to the Secretary, who read as follows:

PRINCETON, BUREAU COUNTY, ILL., Dec. 5, 1873.

To O. B. Galusha, Secretary State Horticultural Society.

DEAR SIR:—As it is impracticable for me to be present with report in person, I transmit it by mail, with one dollar membership fee for 1874, wishing the members of the Society a pleasant re-union, and progress in practical knowledge.

The lessons of the closing year have been numerous and novel.

After our long experience in the culture of apples, it had been generally conceded by orchardists that pasturing rather closely with hogs was the very best plan yet tried.

In this vicinity, and so far as heard from in the fruit district represented by me, it is decided, from results of last winter, that we have as yet found no mode of treatment more fatal to the apple tree.

As to hardiness of varieties, we have formerly placed Ben Davis and Red Romanite in the front rank. The past winter, in many instances, but few varieties were injured more, while Maiden's Blush, Fall Wine and Domine, among varieties heretofore regarded as a little tender, came through in good order, and bore good crops for the season.

The yield of apples generally was very meagre; in a few instances some varieties produced from one-half to a full crop. Cole's Quince, Willow Twig and Rawles' Janet, in addition to varieties previously named, bore well. In time of scarcity, as this year, it is found more profitable to market most of those ordinarily used for cider; second

quality of fruit, including the last named, has found ready sale in neighboring towns at one dollar per bushel.

Cherries were injured in fruit buds, and, in some instances, trees of hardy varieties were killed by the winter.

Pears bore but little; fruit imperfect, and many trees winter killed; worse with me in cultivated than in grass land. Flemish Beauty, Beurre D. Anjou and Seckel endured the winter best.

Grapes were unprotected—generally suffered—but by rather close spring pruning, of Concord and Clinton, half a crop of good fruit, and healthy growth of vines, were obtained. I am laying vines on ground this fall, and covering with evergreen boughs.

Strawberries were not plenty; quality good. A small green worm made sad work, eating the leaves early in the season. Hope Dr. Le Baron can tell us how to rid the vines of them before another summer, or I fear we will have no fruit. It is said that wood ashes and lime will kill them. Summer mulching with prairie hay proved of great benefit in giving vigorous growth at time of drought: it was found convenient for rapid application as winter protection. In my opinion irrigation is just *the* thing for strawberries and market gardening. Hope some of the early graduates from the Industrial University will make practical illustration of its benefit in the Artesian Well region,

Currants gave a fair crop—no trouble, to my knowledge, from currant worm.

Gooseberries in some gardens bore well, in as many others were barren. Downing's Seedling is larger than Houghton, as productive and free from mildew; does not propagate readily from cuttings. This and Mountain Seedling, from my experience, must be layered.

Raspberries, in a few instances, were winter killed. The hardy varieties generally produced good crops, which sold in towns about here at ten to fifteen cents per quart.

Blackberries and *Plums* showed but little fruit.

The short crop of apples and potatoes of this year is liable to be repeated; hence our people should give increased attention to the kitchen garden, and to the best varieties and best modes of culture of the potato.

Early Rose has been the most productive of any variety. By early planting, good culture—mostly with the smoothing harrow—and finally ridging up with a moldboard plow, and when the Colorado bugs are in a soft state, brushing them into the furrows with a broom, I have succeeded in growing a good crop the past season. I used the hoe very little in cutting out weeds. Peerless is a promising variety.

Tomatoes.—It will pay to tie them to stakes, and on approach of frosts cover with evergreen boughs. When they can be left out no longer with safety, it is a good practice to cut off the vines or branches with fruit upon them, and spread them evenly upon the cellar bottom, bringing them up and ripening them in the sun as wanted. They may be thus kept until November.

Salsify should receive more attention than has been given it; it is very little known by the mass of our people.

Cauliflower and *Broccoli*, though generally deemed as choice, expensive vegetables for the tables of the rich only, are, however, not difficult of culture, and every family having a garden should grow them.

It is in our gardens that we hope for instruction in the higher culture to be eventually practiced in our farming operations. We here see, on a small scale, what we may be led to practice generally—the benefits of frequent stirring the soil, special manures, irrigation, shelter, etc.

Timber Culture is slowly gaining the attention of our people. European Larch is the leading variety used.

It is hoped that the work begun at the Industrial University will be carried forward, demonstrating to pupils and our people, the varieties for various soils, best modes of planting, culture, and the ultimate profits. We *must* awaken in the rising generation a perfect enthusiasm in this work, for *we all know* that timber cannot be grown for the needs of the prairie region, before our supply will be exhausted, at the present rate of consumption.

SAMUEL EDWARDS.

Mr. Edwards has sent in letters from correspondents in his District, of which the following are condensed copies:

C. H. Keim, of Mount Carroll, Carroll county, writes:

"I have endeavored to write out a report, but the effects of the past winter seem so much of a mystery that I am unable to make it satisfactory to myself.

"*The Apple Crop* of this year was very light, and the fruit generally inferior in quality, probably owing to the unusual severity of the past winter. Many trees were killed, even in old orchards, and of varieties heretofore deemed hardy, such as Winesap, Red Romanite, and others of similar reputation; while trees of varieties which we have considered somewhat tender, as Maiden's Blush and Fall Wine, have passed through the winter without apparent injury, and borne full crops of good fruit. Trees standing in sod, closely planted, seem to have endured the winter with the least damage, while cultivated orchards, thinly planted and without protection, are badly used up.

"*The Pear Crop* was a failure, and many trees were killed.

"*Cherries* suffered like the pears; even Early Richmond trees, on the Mazzard stock, were badly killed; some also on the Mahaleb stock.

"*Grapes* were generally a light crop, though in a few instances bore well. Concord and Clinton, where protected through the winter, even with a few weeds, came out well; but where they had been cultivated well and left without protection over winter, were badly damaged.

"*Blackberries*.—Lawton, Kittatinny and Wilson's Early all winter killed.

"*Raspberries* varied from a full crop to the entire killing of the bushes. Doolittle, Mammoth Cluster, Davison's Thornless and Philadelphia, are the varieties generally cultivated.

"*The Strawberry Crop* was very light.

"A Natural Dwarf Apple Tree has been cultivated in this vicinity about thirty years, which has never been injured by the winter, is a good bearer, fruit as large as a Willow Twig, ripening about the same time as Early Harvest, and is a good dessert fruit. One tree, twenty-three years otd, is about four feet high, and has bore two bushels of fruit in a season. The trees have been propagated by suckers, which come into bearing in four or five years after planting."

WILLIAMSON DURLEY, of Hennepin, Putnam county, sends the following:

"I said in my report for 1872, that Putnam county had produced the largest crop of apples that had ever been produced in any one year.

"I believe the crop this year has been the nearest a failure of any year since we have had orchards in bearing, probably caused principally by the past severe winter. In almost every bearing orchard in the county some varieties have been killed, and many others are very much injured, and, I think, will never recover to make good bearing trees again. Amongst the varieties that have been killed of bearing trees, are the Fallawater, and Milam; and those that have been materially injured are the Red Baldwin, Fall Pippin and Belmot; and those that have been partially affected are the Gilpin, R. I. Greening, Rawles' Janet, Sweet Vandevere, Sweet Bough, and on clay soils, the Yellow Bellflower. The varieties that have matured fruit this year are the Red June, Early Pennock, Maiden's Blush, Fameuse, Fall Winesap, Fall Wine, Priestly, Roman Stem, Pennock, Smith's Cider, Willow Twig, and, in some localities, Yellow Bellflower.

"*Pears* were almost a failure; all were very knotty, with the exception of the Washington and Napoleon, which matured well; and I would just say that I consider the Washington a valuable pear in its season, (September), a good bearer, and No. 1 in quality.

"*Peach* trees were mostly killed.

"*Cherries* were a failure, with the exception of the Early Richmond, which bore a fair crop.

"*Grapes* were a fair crop—the Concord being the most prolific variety.

"All the small fruits were a short crop; and *Blackberries* an entire failure.

"In regard to the influence of adjacent or surrounding groves or belts of timber upon orchards, I have not perceived any difference, in the effects of the past winter, between orchards that were protected by groves, and those that had no protection.

"My mode of planting and cultivating an orchard is to plant in the Spring, when the ground is in good condition to plant corn, and cultivate the orchard in hoed or plowed crops for at least ten years; after that sow to clover, and pasture with hogs each year until August.

"The best mode of gathering apples is to have plenty of ladders and half bushel baskets, with hooks attached to the handles to hang the baskets to the limbs.

"Apples keep the best for me in clean barrels, headed up and put in a cellar, just cool enough so they do not freeze.

"From an experience of thirty-five years in the culture of fruit, particularly apples, the varieties I have found most profitable for market, to succeed each other through the season, are the Red Astrachan, William's Favorite, Early Pennock, Porter, Maiden's Blush, Fameuse, Wagoner, Sweet Vandevere, Smith's Cider, Ben Davis, Domine, Rawles' Janet, Winesap and Willow Twig."

VERRY ALDRICH, of Arispe, Bureau county, writes as follows:

"I herewith send you a few horticultural notes for the past year.

"*Apple Trees* came out of last winter, seemingly, in good condition, and I did not notice any serious damage until they were in full bloom. They all blossomed very full, even those that fruited so very full last year, and then both blossoms and leaves began to dry and turn brown—some trees on one side only, others all over the tree—showing that the vitality was nearly or quite destroyed. Now and then a tree withered away and died, while others remained about *statu quo*—with not life enough to make any growth, and not weak enough to die outright. These two classes were not very numerous in my orchards; the great majority put out their leaves about one-half the common size, and remained so throughout the season, making very little growth.

"In the latter part of the season they assumed a more healthy appearance, matured well, and I think promise a bountiful crop next season. Those that seemed half-way

between dead and alive, showed more signs of life the latter part of the season, and may possibly revive next spring. I noticed but little difference in the effect of the winter upon different varieties, where all were equally exposed—such varieties as Baldwin, Rambo, and Maiden's Blush, which we have considered tender, seeming quite as healthy as any. I have heard more complaint about Ben Davis than any other variety, though it is not so with mine. Heretofore we have considered it the most robust and hardy of any tree on the list.

"A year ago last spring I set quite a number of grafts, of various sorts, into bearing trees—denuding most of the tops. The grafts took and grew from two to three and a half feet. White Bellflower and Newtown Pippin trees thus grafted killed outright last winter, while other trees into which the same sort was grafted, came out with only now and then a dead branch. Domine trees, which did not fruit last year, bore very well this year; but the bulk of our apples were Willow Twigs, although the trees of this sort seemed to have suffered as much as others. This year I had nearly one hundred barrels of apples, besides making twenty barrels of cider—showing that two-thirds of my crop was unmarketable fruit; those called good were inferior to last year's fruit. The two previous years I packed over twenty-two hundred barrels of apples, and made over two hundred barrels of cider.

"Young orchards have this year fruited better than old ones, and Willow Twig has been more uniformly prolific than any other variety, as far as heard from, in this and the adjoining counties.

"I attribute the damage to fruit trees, so general this year, to the following causes, viz.: Trees bore extremely full last year and the year before, and had become much weakened in vitality; the very long, extremely cold winter, nearly destroyed the feeble life they then possessed, and this was followed by an excessively cold, wet May, and an extremely dry, hot summer.

"*Pears.*—Most of my trees have blighted and died, except Tyson, which always bears a crop. Flemish Beauty has always done well till last and this year, but trees of this variety, as well as Bartlett and others, are badly affected with blight.

"*Peaches.*—I have eighteen trees, three years planted, which, last year, bore a few good specimens; this year, about one-half the trees are dead. They stand in two rows on the north side of a grove of evergreens. The trees in the row next the evergreens, and upon which the sun hardly shines during the winter, look quite well. Those standing in the next row get the rays of the sun, and are dead, showing that sunshine upon the trees, when hard frozen, may be destructive to them.

"*Cherries.*—Trees of the sweet varieties seem as little damaged as the healthiest apple trees, and bore about one-third of a crop, which the birds appropriated to their use. A double-barrel shot gun, well loaded with powder und mustard-seed shot, is the best preserver I have used for saving this fruit. I shall continue its use.

"*Grapes.*—I have but few vines, consisting of Concord, Martha, and Ives' Seedling; these appeared so much damaged I thought it would not pay to cultivate them, therefore let the weeds grow. Some vines died, while others bore a full crop; but the fruit did not ripen well—showing that good culture is required to secure good fruit.

"*Raspberries* were a good crop. I give preference to Mammoth Cluster (McCormick) and Seneca, though cultivate Davison's Thornless, for early fruit.

"*Strawberries.*—I have found Wilson to be the only reliable and productive sort.

"*Profits of Small Fruits for Market.*—It was formerly profitable to raise cherries, grapes, and strawberries to ship to Chicago, but since so much fruit is grown South and sent to market in advance of ours, and since the increase of fruit plantations nearer market, we find the business of raising these and other small fruits, for that market, unprofitable here. I also find no profit in wine making; for though druggists and others may call my wine 'very good,' *it don't sell.*"

A letter from Wm. A. Nourse, Moline, Rock Island county, expresses the same opinion as to the cause of the failure in the fruit crop and damage to trees as is given in the foregoing reports, with the addition of a suggestion that on account of the destruction of multitudes of honey bees by

the winter, the fruit tree blossoms were not fertilized as generally as usual. He thinks, also, that the rain storms, which were so general while orchards were in blossom, had the effect to blast the flowers. He further writes:

"I have noticed that soil not in cultivation has become dry very deep, while cultivated ground is more moist—even the road, with several inches of dust upon it, was found moist below the dust, while at the roadside, where free from dust, it was dry for one, two, or more feet. This seems to show the imperative need of cultivation." [Mulching?—Ed.]

"Fruit trees grown near timber, or surrounded by it, have suffered perceptibly less than those grown in exposed locations. The extreme dryness of the summer has caused death or severe injury to a large proportion of trees transplanted last spring; there is now—November—a great lack of water, compelling us to dig new wells or deepen the old ones."

Mr. Gove Wright, of Rock Falls, Whiteside county, contributes the following:

"The horticultural record for the year 1873 will, I think, show greater disasters to trees and fruits than any written since the organization of this Society. The three previous years of continued drought had exhausted the earth of moisture below the reach of most fruit, ornamental and forest trees; the little rain we did have only stimulated an unnatural and excessive growth of surface roots, which, like any surface watering of plants in summer, rendered the trees unfit to endure the severity of last winter's frost, or the drought of the present summer. These surface roots were, in many instances, killed, while the lower roots, as well as the trunks and branches, were uninjured; but as these lower roots were situated in dry earth, they could furnish no sap to sustain the life of the tree, and consequently, after putting forth a feeble growth of leaves, and perhaps blossoms, from the sap stored in the trunk, it withered and died. Perhaps my explanation is not very clear, but to my mind it is sufficient to account for a singular fact which has been observed by many farmers in this vicinity, viz.: That in one part of an orchard the 'hardy' as well as the 'tender' varieties were all killed, while in the rest of the orchard, which was equally exposed, only the tender kinds were injured. I have cut cions from several trees in the spring, and while the cions grew finely, the trees from which they were taken soon after died. So far as I can ascertain, the part of an orchard which was killed had a dry subsoil, while that of the balance was more moist. It will be seen that the condition of a tree with its surface roots killed and its lower roots in dry earth, would be like that of a cutting placed in dry soil and watered on the surface.

"Notwithstanding the unfavorable season and the insects, the supply of summer and fall apples was sufficient for home consumption, but there is a scarcity of winter varieties. The few *Pear* trees which have arrived at maturity in this county have given their usual abundant yield of fine fruit. Many complain that their trees in young pear orchards have died, but all such which I have examined were naked-bodied trees, exposed to the sun, and have been injured every year on the south side since they were planted. I have one hundred, which were planted in 1858, by digging a place in the sod about two feet in diameter, and putting in a root graft on pear stock, and every year they have been spaded twice and enriched with compost from the hen roost and privy, mixed with ashes. Not a tree has been injured or lost, and some of them bloomed last spring. The soil is sandy, and the trees are pyramids with limbs to the ground.

"It will not do to call a tree 'tender' because it was killed under such circumstances, and for this reason the past winter was no real test of *hardiness*, except of those varieties which were universally killed by exposure. I cannot discover that screens or timber belts have been of any benefit to orchards, while the fruit trees standing near a hedge, or a row of willow, poplar, or maples, have suffered more from drought than others. I have observed that all the orchards in this vicinity which were planted over a

hill, have lost all the trees on the southern slope, while those on the north side of a hill were vigorous and healthy.

"The only enemy to apples, worthy of note, is the Codling moth, and that has been so numerous this season that it is rare to find an apple which is not already pre-empted by a larva. We shall try to protect our trees another year.

"*Grapes* have generally been reduced to one variety—the Concord. I have tried to raise Delaware, Iona, Rogers' Nos. 4 and 15, Walter, Martha, and Eumelan, and I had them all in bearing; but I have now only Concords, with a few each of Hartford and Clinton. The Concords were tied to stakes and not pruned till spring, while the others were covered slightly with earth. Concords have been plenty and very fine—sold for five cents per pound.

"A few *Cherry* trees were killed by dry weather and frost, but the Early Richmond produced quite a good crop. Of *Raspberries*, McCormick (Mammoth Cluster), Davison's Thornless, and Philadelphia, gave as good crops as usual, while I hear some complaint of injury to Doolittle's. Kittatinny *Blackberry* was badly injured.

"*Strawberries* were generally winter killed, and the drought and small green worms have destroyed nearly all of last spring's planting. Late Kentucky is perfectly hardy, but I have not fruited it yet.

"I think evergreens were uninjured last winter, but many Norway Spruce have dried up late in the summer. We are just finding out that our sandy soil will not suit Norway Spruce, Balsam, White Pine, or Larch, in a dry season.

"More than one thousand dollars' worth have been lost in this town within two years, while I have never seen a Scotch or Austrian Pine that seemed to suffer from either drought or cold. How they can live on a sand knoll which is dry as powder for six feet deep, without a shower from the fifth of July till September (trees planted last spring), is beyond my comprehension.

"One and two years old nursery trees of Apples and Pears were very badly killed out last winter, and many varieties of three and four years were killed back within two feet of the ground. Rawles' Janet, English Russet, Winesap, Stannard, Haas, Seek-no-Further, Bethlemite, York Imperial, Bellflower, Roman Stem, Fameuse, Porter, Fall Orange, Autumn Strawberry, Red June, Duchess, Keswick Codlin, Tolman Sweet, Early Harvest, Northern Spy, and Sweet June were not injured in my nursery, Ben Davis, Stark, Domine, Wagoner, Willow, Fulton, Lowell, Red Astrachan and many others were, in some instances, slightly injured in the nursery, but not at all in the orchard. Grimes' Golden, Jonathan, Maiden's Blush, Minkler, Rhenish May, Rambo, King of Tompkins, and some others were more injured in the nursery, by some of the tops being killed; but I have seen no twigs killed in bearing-trees. Maiden's Blush and Grimes' Golden were tardy in putting out their leaves, but have borne well and made good growth. I think Grimes' Golden will be all right for the orchard if it proves to be a prolific bearer. I have a hundred eight-year-old trees which are beginning to bear, and I shall soon know.

"Out of over one hundred varieties of apples, in nursery and orchard, I have lost no trees over three years old except Early Red, Smokehouse, Baldwin, R. I. Greening and Rambo.

"*Forest trees*, except Black Oaks and Pig-nut, were uninjured. Roses and shrubbery came out in the spring and bloomed as usual. Mine were not protected."

J. B. REDENOUR writes from Woodhull, Henry county, giving details of the same experience and observations as others in the preceding letters. Among the varieties of Apple trees in orchard that have endured and borne some fruit, he names the Ben Davis, Domine, Winesap, Red June, Red Astrachan, Duchess of Oldenburg, Snow, Fall Wine, and Bailey Sweet.

The varieties most injured or killed are Yellow Bellflower, Northern Spy, Rambo, White Winter Pearmain, Jonathan, Willow Twig, and Tolman Sweet. He would plant these vatieties for market.

He writes that Pear trees in the county are nearly all killed; and that the Apple trees planted out last spring are dead or in a dying condition.

Raspberries were a good crop—he regards Davison's Thornless as the hardiest.

Orchards protected by even three or four rows of maple trees have suffered less than those on the prairie without any protection.

He recommends Concord Grape, and Doolittle, McCormick, and Davison's Raspberries.

M. B. SPAFFORD, of Dixon, Lee county, contributes the following:

"*The Cherry Crop* was very near a failure in Lee county. There are a few orchards of Early Richmonds in the county and these have done well until this year; but owing to excessive bearing for two years previous, did not bear much this year, though making a good growth. They seem in good condition to bring a crop next year. There are plenty of Morello trees, but they have borne little this year, and many of them have died. The May Duke, Belle Magnifique, Gov. Shannon and Gov. Wood, have usually done well with me, and are valuable varieties.

"*The Apple Crop* of Lee county, this year, has been one-fifth or one-sixth of a full crop.

"The Miami and Doolittle *Raspberries* have produced tolerably well—say about two-thirds of a crop, and, in some instances, a full crop. Very few other varieties of this fruit are grown here.

"The *Strawberry* has done very well this year, although not cultivated as much as formerly here. The Wilson is the best market berry.

"Small fruits are not raised here as much as they ought to be. I suppose the reason is that the great mass of farmers think more of hog and corn; or it may be, that if a variety of fruits were cultivated it would make some brain work at home, and that too many of our farmers are opposed to, rather preferring the town for study.

"The *Grape* has yielded a fair crop of very well matured fruit, and, with all small fruits, has brought good prices. The Concord is the principal grape raised here, being well adapted to our soil and climate, and yields a good must, often as rich as 94° by Oesoheles scales. The Clinton, when the true variety is obtained, is a moderate grower, great bearer, and a fine flavored grape, if left on the vine until frosty nights. It will then make the heaviest must of any variety, and is undoubtedly our best wine grape here.

"'The effect of the past winter upon shrubs and vines.'"

"This subject is of vast importance to us as horticulturists, and should receive our closest investigations.

"Johnson says in 'How Plants Grow,' that the offices of the root are threefold:

"1st. To fix the plant in the earth and maintain it, in most cases, in an upright position.

"2d. To absorb nutriment from the soil for the growth of the entire plant.

"3d. In case of many plants, especially of those whose tenure of life extends through several years or many years, to serve as a storehouse for the future use of the plant.

"If the soil in which the roots are placed becomes too dry to perform its natural functions in the formation of gasses, the roots cannot perform theirs, and we have the cause of the diseased condition in the tree. Or, in other words, if the soil is so dry that the tree remains dormant the latter part of the growing season of the year, the fruit buds suffer in development as much as the tree in its annual growth, and both enter the dormant, or cold season of rest in a condition unfavorable, and hence in the spring we say that it is winter-killed.

"It must not be supposed that a tree remains perfectly dormant through the winter. Many nurserymen have seen trees that were heeled-in in the fall, make six inches of fibrous root-growth before being lifted in the spring.

"There is a difference in temperature of ten to twenty degrees between dry and wet soils of the same kind, and dry soil being the coldest, or rather the best conductor, hence, it will freeze the deepest, so when after a long period of drought we see the injurious effects of cold upon our trees we say it was the winter that killed them, without taking the condition of the trees into account.

"We can, by cultivation and mulching, do a great deal to keep trees in a growing condition. Some of my trees have had six to eight inches of coarse manure applied in midsummer around them, and it has benefitted them by causing the soil to remain moist, hence, the growth was good and well matured, and such trees have invariably wintered well and been productive.

"The beneficial effects arising from protection by groves of trees have not been as great in cases that have come under my observation as reported by many. I have three orchards, and in all of them the outside rows on the south and west sides are the most productive and thrifty, while neither of them have any groves or belts of timber in a mile in that direction. What is true of my orchard is also true of all others that I have seen, both on the prairie and in the natural timber. And while I say this, I must also say that it is contrary to my former opinions, and that I cannot give a good reason for the fact.

"Of varieties for a commercial orchard, I would set the Willow Twig, Ben Davis, Gilpin and Golden Russet. The Keswick Codlin and Duchess of Oldenberg have yielded the most apples and money for me, of any, but of course we should be governed by nearness to market, etc., in setting summer varieties. The Jersey Sweet is very productive and useful as a cider apple in the fall. The Snow is my favorite in its season, and is satisfactory in quality and profit. I think that apple growers here should build fruit houses to keep apples in, where a cool atmosphere can be kept, say as low as 40°, and I propose to our Society that a diploma be offered to the successful inventor of such a method. Our seasons are such that our cellars are too warm in the fall for such varieties as Golden Russet, etc., which ought to be picked by the 10th of September, and if put in a dry atmosphere, of say 40° or 45°, would not wilt, but remain crisp."

L. K. SCOFIELD, of Freeport, Stephenson county, sends the following valuable communication:

"I am sorry to say that my present report of the horticultural interests of Northwestern Illinois, and of Stephenson county in particular, will be less favorable than preceding ones; but we cannot controvert facts, even if they do have a disastrous effect on our own pride. The winter of 1872 and 1873 was very disastrous in its effects on fruit trees. Cold weather set in about the 6th of November, finding many of us unprepared for it; and while we were waiting for milder weather from day to day, to protect our tender plants, it continued only to increase in severity, and the result was that many of the plants that we usually covered remained unprotected through the winter. The scanty rains of the season left the ground unusually dry, and to the want of moisture near the surface, I am convinced, may be largely attributed the cause of damage to both orchard and nursery. As the injury appeared at first only in the roots, the late growth, having well matured, showed no signs of injury whatever when spring opened, and I flattered myself that we had escaped all injury to our fruit trees from the severity of the weather, excepting to the fruit buds, which, on close examination, showed serious injury in many cases.

"I have found but one case of general destruction in old orchards.

"One orchard, twenty to twenty-five years old, on the prairie, six miles west of Freeport, had been used as a hog pasture, and was entirely destitute of vegetation, and nothing left on the surface as a mulch, was entirely killed, with the exception of the south row standing near the fence where the snow drifted in, remaining all winter, and serving as a protection to the roots. This row appeared all right in July. The trees in the rest of the orchard blossomed as usual in the spring, but did not put out a leaf. My opinion is that had this orchard been well mulched in the fall, so as to protect the roots from the severe frosts, it would have been saved. The frost penetrated to the depth of

four to five feet, as proved by digging in various places during the latter part of winter. In no case or situation was it found to be less than four feet. The fall of snow during the winter was light, not sufficient to afford much protection from the extreme cold. I will cite another case: In the north part of the county, twenty-five miles distant from the former, an orchard on the prairie sloping to the north, which had been used for the same purpose, and was apparently as devoid of vegetation in the fall, showed no signs of injury, and at the time I visited it, in August, looked vigorous and healthy, and was well loaded with fruit. This orchard was about fifteen years old, and the trees branched low; while with those of the other orchard it was the reverse. Can any one explain the cause of the different condition of the two orchards?*

"In many orchards I have found occasionally a tree supposed to be killed by the winter, irrespective of variety or location. Hardy varieties, as a general thing, have suffered equally with the tender, and in all cases where I have made a personal examination I have found the damage in the roots, which had the appearance of trees that had been exposed in the open air to the action of frost and heat.

"Perhaps it would not be proper here to speak of the effects of the elements on nursery trees, but I can say that I have examined them in many localities from Yankton, on the Missouri River, to the Genessee Valley, in New York, and even in New England, and yet while east of the lakes they are unwilling to admit it, still, facts demonstrate that *many are in the same boat* this time.

"Our *Apple crop*, while not equal to previous years, compares favorably with any locality I have visited—excepting, perhaps, Niagara county, New York—and in few places have I found so good a crop and so perfect fruit.

"Fall fruit has been in fair supply, and sold on our market for from twenty-five to seventy-five cents per bushel, for home consumption.

"*Pears.*—There are so few pear trees growing here that no fruit of any consequence of home production is offered in the market, but a few amateurs show good specimens of fruit, and I have seen many trees healthy and vigorous.

"*Plums.*—Most of the cultivated varieties, excepting the Miner or Townsend, were badly damaged by the winter. The latter produced but a light crop, and in many cases was altogether barren. The Lombard showed its weak points.

"*Cherries* showed no injury excepting to the fruit-buds (I speak only of the sour varieties), three-fourths of which were killed, and the result was only about one-fourth our usual crop of fruit.

"*Grapes* were very generally left unprotected on account of early setting in of winter, and some of the tender varieties were more or less injured. Hartford and Concord suffered least, and in some cases were killed root and branch; but these were exceptions. Rogers' Nos. 4, 15 and 19, about one-half of them sprouted at the root, but produced no fruit. I gathered my best crop from a row in the nursery of four-year-old vines, untrimmed and trailing on the ground, but kept clean from grass and weeds.

"*Raspberries*, as usual, have not disappointed our expectations, and we have had a bountiful crop, and although the cultivation of this fruit in our midst is constantly increasing from year to year, still there is a demand for more; and each year the demand continues to increase at remunerative prices for good, fresh fruit.

"Doolittle, Mammoth Cluster, Purple Cane, Davison's Thornless, and Philadelphia stand at the head.

"Of the Thornless, I have seen no reason yet to change my opinion in its favor.

"Mammoth Cluster will do well to follow the Doolittle, as the first ripens a little later.

"*Blackberries* do not prove hardy or remunerative, unless partially protected in some hedge-row or under the shade of trees. All those exposed last winter were badly killed, root and branch; yet we found roots enough left to mark the place where they had grown.

"Houghton Seedling *Gooseberry* never fails us.

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* The low spreading branches shading the ground under the trees prevented the excessive drying of the soil, to which the other orchard was exposed.—Sec.

"*Strawberries* were quite generally killed. The Wilson is our principal berry, but the past season this afforded very little fruit.

"Of *Peach* trees not one was left to narrate the story of their death.

"*Evergreens*, of the hardier varieties, showed very little injury. Occasionally a few of the terminal buds appeared injured on the Norway Spruce, but most of them grew. White, Scotch, and Austrian Pine, Siberian Arbor Vitæ and Balsam Fir showed no signs of injury.

"American Arbor Vitæ and Irish and Swedish Junipers were slightly scalded; Chinese Arbor Vitæ must be protected; the Junipers need slight protection when young.

"The year now closing might afford themes for volumes, but we have not time now to discuss them.

"We cannot control the elements, but can do much to allay their severity, if the minds of the people can be properly educated. We need protection in growing fruit. We demand forest planting for the amelioration of our climate, and even for perpetuation of a free and happy people. Will we be recreant to our own interests and to the trusts imposed upon us by remaining inactive in regard to this work, and permit posterity to point to our selfishness as the cause of the decline of this great Republic? Herein is the impending danger. Let us take such action as to avert it, that generations hence may not point to its decline and downfall as we now do to that of many portions of the Old World."

ORNAMENTAL AND TIMBER TREES.

W. C. Flagg, from the Standing Committee on Ornamental and Timber Trees, read as follows:

CONDITIONS OF TREE GROWTH.

In a report presented to the Society last year, I gave a statement derived from the census of 1870, showing that our State had 14.1 per cent. of its surface in some kind of tree growth—that Northern Illinois had only 7.5 per cent. of woodland, whilst Central Illinois had 10.8 per cent., and Southern Illinois, 23.7 per cent.

Assuming the woodland in farms to be all, more than two-thirds of our State contained but a small ratio of timber, although we border upon the wooded region of Indiana, which, but for settlement and cultivation, would stretch out an unbroken forest to the Atlantic, and although the more southerly State of Missouri on our west had an average woodland area of 21 per cent., and our southern region of our own State, as I have shown, 23.7 per cent. In other words, Central and Northern Illinois are just out of, and on the verge of successful natural timber growth, such as is seen in the magnificent forests of Indiana and Michigan, and of our lower Egypt. They are subject to unfavorable conditions, apparently, which increase as one goes westward. Iowa had but about 7 per cent. of forests, and Colorado still less. These conditions must be known and appreciated by all who would plant trees; and I propose to devote this report to a consideration of the facts affecting tree growth in Illinois.

A tree exists in the earth and in the air. It has certain root functions that must be performed beneath the surface of the earth, and will be performed well or ill, according as the soil and subsoil are congenial; and

certain leaf functions, that are dependent for their proper discharge on the atmospheric conditions of cold, heat, moisture, dryness, winds, etc., as adapted to the nature of that particular tree. The tree cannot survive unless it can perform these vital functions with at least tolerable success.

It is conceivable, also, and may be assumed as a matter of fact, that, the conditions of soil and climate being propitious for tree growth, the seeds of trees may be wanting, and that for long periods, a region once unfavorable to tree growth may, after it becomes fit for tree growth, be destitute of trees, simply because the seeds of those trees have not been transported thither. And finally, a soil and climate that may grow trees, once planted and rooted, may be unfavorable to the germination of seeds, except in rare seasons, and a few places; so that even though trees have not sprung up spontaneously, they may, with due care and attention, be planted and established so as to live a reasonably long life.

When we examine a region, then we will naturally inquire which of these various conditions prevails, and may predicate success with greater or less confidence, accordingly. Our Illinois region being just without, and indeed almost surrounded by, a forest country, it may be safe to assume that there is no inherent difficulty in the way of climate that does not also exist in the adjacent wooded regions, to nearly the same extent. But it is true that in the West, at least, we must expect a permanent disability in securing the perennial vigor and centennial life that is attained in climates of fewer extremes. We have, I believe, absolutely no old orchards, as compared with western New York and New England; and compared with the long tenacity of life shown in the moist atmosphere of England, our trees are apparently ephemeral. They grow large and rapidly; they furnish valuable timber, but they do not endure, after reaching maturity, like the European trees standing in a climate equable in moisture and warmth. I believe this difference is least apparent on our Atlantic seaboard, and increases westwardly, as we lose the influence of the sea, and is intensified until it becomes quite unfavorable to tree growth in the extreme droughts and the intense cold of our western plains. This is the common evil of the Prairie region.

But concerning Illinois: We find a minimum of woodland in Ford county; and the adjoining counties of Livingston and Grundy come next in the scale. This part of the State, you will notice, is the region of the sources of a number of small rivers, flowing in all directions, among which are the Vermillions, the Kankakee, Sangamon, Mackinaw, and Okaw, implying that here a shallow lake has been drained off in various directions. It is as complete an example as can be had, perhaps, of Lesquereux's theory of the Formation of the Prairies, as given in the first volume of our Geological Report. This theory, in the language of its author, is, "That all the prairies of the Mississippi valley have been formed by the slow recess of sheets of water of various extent, first transformed into swamps, and by and by drained and dried." "It gives," he says in another place, "the reason of the presence of the prairies from the base of the Rocky mountains to the borders of the Mississippi river;

of the prairies around the lakes, and of those of the broad, flat bottoms of our southern rivers; of the *plates* of the Madeira river; of those of the Paraguay; of the *pampas* of Brazil; even of the desert plains of our western Salt Lakes—for this formation is produced in the same manner in the salt marshes of the sea, as in the fresh-water swamps of our lakes."

Hence, Mr. Lesquereux ascribes the original absence of tree-growth to the nature and condition of the soil. "This peculiarity of formation explains, first, the peculiar nature of the soil of the prairies. It is neither peat nor humus, but a black, soft mould impregnated with a large proportion of ulmic acid, produced by the slow decomposition, mostly under water, of aquatic plants, and thus partaking as much of the nature of the peat as of that of the true humus." In all the depressions of the prairies, where water is permanent and unmixed with particles of mineral matter, the ground is true peat.

"It is easy to understand why trees cannot grow on such a kind of ground. The germination of seeds of arborescent plants needs the free access of oxygen for its development; and the trees, especially in their youth, absorb by the roots a great amount of air, and demand a solid point of attachment to fix themselves."

He adds that the Tamarac is the only species of tree that will grow in a peaty ground in the northern climate; and suggests for planting on prairie soils, trees that will support a certain degree of humidity—such as Elms, Sycamore and Honey Locust.

Henry Englemann, also at one time engaged on our Geological Survey, in an examination of the cause producing the prairies, flats and barrens of Southern Illinois, says of the southern prairies: "Undoubtedly the condition of humidity of the soil exercises here the most prominent influence on its vegetation. The chemical composition of the soil naturally also affects the flora; but as our prairie soils do not appear to have any very peculiar composition, chemistry may account for the absence of certain species of trees, but certainly not for the absence of all trees."

The soil of the southern part of the State, I may add, seems to have little of the peaty character of the soil of Northern and Central Illinois. It is more finely subdivided, having a silt-like appearance, as though deposited in the still water at the lower end of a lake that deposited the coarser material farther north.

But in both cases there was an original unfitness for tree growth, covering a much larger part of our State than at present, caused simply by humidity. Within the last thirty years, as many here present can testify, there has been a great change. I can remember, and so can many others, when fields now dry enough for cultivation were covered with water for weeks in the winter and spring, and were regarded as of no practical value. But as flocks and herds have eaten off the grass and let in the sunlight, the work of gradual drainage and amelioration already going on has been greatly accelerated.

It was also found to be the case, in my own region at least, that lands that had already prior to settlement under natural influences, apparently, become fitted for tree growth were kept in the condition of

prairies by the annual fires that swept over the rank herbage and consumed with it nearly every sprouting tree. There were exceptions to this. In the damp ground along the streams it was possible for some trees to grow, because the grass would not often burn; the shade of the tree when growing would be unfavorable to the rank growth of grass; the stream itself, if of some size, would occasionally be a barrier against fire; so that, judging from the size of the trees now standing, here were the first tree-growths. Again, on the broken grounds near streams, where the soil is less fertile than farther back on the prairies, the grass growth was less luxuriant and its combustion less common and less destructive of young tree-growths. The soil, too, was there better drained and fitted for tree-growths than on the level prairie; and here we find the next growth of trees, to all appearance, in point of age. One other exception is, or rather was, found in lone trees of the Black-Jack (*Quercus nigra*) and Mocker-nut Hickory (?) (*Carya tomentosa* ?) of considerable age, that, in advance by half a century, one would guess, of other trees, have grown up alone out in the drier prairies.

Upon these grounds, already prepared for tree-growth, the only thing needful was to exclude fires, excessive grazing and tramping, and other destructive forces, in order to secure an almost immediate growth of forest. This growth, as Mr. Englemann shows, would even reach beyond the broken grounds and constitute what he calls "Flats," on which is a tree-growth composed mostly of "Post-Oak," a tree remarkable for its many and small roots.

In the small prairies of Madison and other counties these various tree-growths would readily fill, if permitted, all the original prairies; but in the large, flat, and still concave prairies, away from the rivers and without natural drainage, in a pervious subsoil, the soil remains unfavorable to nearly, and in some cases to all tree-growth, unless ameliorated by artificial means. Among the trees that seem to endure the humidity of soil the best are the White Elm, Cottonwood, Soft Maple, Willows and, perhaps, the Ashes. (I speak of the species considered desirable to plant). These, I believe, are mainly spreading-rooted trees, that can gather their sustenance, if need be, from near the surface, without striking into the unwholesome subsoil. Cottonwoods and White Elms, both of which will flourish in dry situations, also wonderfully—will almost grow in a pool of stagnant water, and show a great range of adaptation. The Chestnut seems to require a well-drained subsoil to succeed at all, while the Hickories, whose marked peculiarity—as any one knows who has done a day's work at "grubbing" our Western young growths—is its tap root,seems to bore its way into the "hard pan" without injury, except as shown in a smaller size and probably a shorter life.

This subsoil is not the only difficulty in the coarser and more peaty soils of part of the central and northern portions of the State. These open soils admit sometimes too much air for the health of the plants, hence the winter wheat freezes out, and the soil must be packed and tramped about trees to insure its compactness, and trees in dry cold split open because they have exhausted the little moisture within reach of their

roots. A tree thus situated, whether it strikes its roots deep into a poisonous subsoil or, horizontally into an open topsoil, is in danger of coming to grief.

But it is both of these conditions we must cure to have success in tree growing. Pasturage and cultivation do much in admitting the sun's rays and promoting evaporation; in giving a free course to water and securing a more rapid drainage. The surface soil settles, too, as it is cultivated, several inches and becomes compact, so that wheat grows on land where it would formerly not endure the winter; and, in like manner, trees grow, even spontaneously, on lands once entirely unsuited to their existence. These are the improved conditions that come without special preparation.

Again, a good deal can be done artificially. Surface drainage can be promoted rapidly by ridging land, as our worthy president does in his orchards, and, more slowly but more satisfactorily, by ploughing fields in one's land and always throwing the furrows to the center, which, before many years, will clear even a level field of surplus surface-water.

But it will be found, probably, that the amount of land of this character, that any one will desire to plant, will be small. The artificial forests that furnish the timber of the future can be grown more economically in lands that, from their broken surface or for other reasons, are not adapted to field culture. The plantations that the farmer on the wet prairies will desire to make are of belts and clumps, to break the force of the winds and storms, to husband moisture, and incidentally furnish timber for fuel and farm uses where coal and sawed lumber cannot be had at reasonable rates.

An interesting point, which I touched upon in my report last year, is the probable natural order, if there be any, of succession in plant growth on our Illinois lands. Mr. Lesquereux believes that when the water becomes as shallow as three or four feet, Mosses, Confervæ and Charas begin to appear. At a depth of one foot Sedges begin to appear, and then coarse grasses. Then apparently the order is more uncertain, as accidental causes bring in the seeds of differing plants that will succeed more or less in establishing themselves. This brings up some curious questions. Why is the Persimmon, a tree which grows and thrives on dry land, found standing so often in soil that is at least a part of the year covered by water? Why does the Willow, of the wild species, seem to affect the streams rather than the pools? Why does the Black Jack Oak start up in the prairies where no other oak survives? Why does the Mocker-nut Hickory do the same? We can speculate upon the reasons of these facts, but I find them difficult to positively account for. But we find that for some reason one tree grows by nature, or favoring natural conditions, while another does not; that one species or variety of tree, when planted, thrives easily, while another can be hardly kept alive by the most skillful treatment. We may assume, perhaps, that the trees that grow readily do so from fitness; that the Laurel Oak, the Post Oak, the Water Oak, the White Elm and Cottonwood, that we find growing on the borders of our flat Southern Illinois prairies, and in wet cold lands on

the low grounds, do so from inherent fitness or great power of adaptation —that when Mr. Dunlap fails in growing the trees of the Sweet Cherry, and Mr. Vickroy of the Chestnut, that it means the soils they planted on are *not yet* fitted for trees that, like them, love a dry, warm subsoil; that when Mr. Dunlap grows the Soft Maple, and Mr. Vickroy the Ashes, the Catalpa, the Osage Orange, the White Elm and Butternut, with only a small per cent. of loss in the first few years, the chances are that those trees have come in due time to the Central Illinois prairies.

Here, again, we are admonished that a success or failure, limited in time and area, must not be made too much of. The wonderful success of D. C. Scofield, of Elgin, on a soil "underlaid with *gravel* at a depth of from six to ten feet," must not be pushed too far as a precedent in talking to men who have *blue clay* at the same depth, and *vice versa*. The conditions are essentially different. And whether the European Larch, the Scotch and Austrian pines are to furnish our future artificial forest, must depend on a much longer experience than we have yet had.

This leads me to say a word of Evergreens, or Conifers rather. We have three natives of our State that have proved themselves capable of enduring our climate, and, at least, some of our soils from youth to old age and large size; these are the White Pine, the Red Cedar, and the Cypress. The White Pine, of which there are, or at least were, large old forest trees at Rockford, has done more to "build up" America than all other trees. It has a wider natural range of climate, and accommodates itself to a greater variety of soils than any of the lumber-furnishing trees of the northern forests. The Red Cedar, according to Gray, has the greatest climate range of any woody plant in America, (from Middle Florida, at 26°, to latitude 67° beyond the Arctic circle.) It is the one evergreen that the drought of the plains cannot kill. "In the dry climate of Texas and the Dacotah region," says Dr. Cooper in the Patent Office Report of 1860, "the Red Cedar becomes a prominent tree, covering large tracts, where scarcely any other will grow; and in the Comanche, Wasatch, Yellow Stone, and adjoining regions, it becomes over vast districts the only tree growth, and therefore of great importance. On the bluffs of the Platte, Missouri, Canadian and other rivers, it appears with trunks three or four feet thick, which, judging from its slow growth, must be of immense age." The Cedar also thrives in a great variety of soils. These occur only where bluffs, bare rocks, or gravelly land, have stopped the spread of fires, but serve to show that this useful tree might, if protected from them, be made to grow on many parts of the now treeless plains. On the islands of the Platte, thus protected, and in good soil, it attains its highest development, the dry climate seeming well suited to it. Showing that it requires summer heat rather than moisture, we find it growing at the east base of the Rocky mountains, in lat. 51°, while along the Atlantic it reaches only to lat. 43° in Maine. North of these limits a low shrubby form takes its place, considered by some identical, and reaching latitude 67° on the Mackenzie river." The Deciduous Cypress is limited more in its range northward, but in Southern Illinois grows finely, and within its range grows well on dry

land, and endures drought and heat with serenity. As a valuable timber tree of great durability it stands preeminent.

It is possible that in the European Larch, Norway Spruce, and Scotch and Austrian Pines, we have something better for useful purposes; at all events valuable; but we cannot speak with absolute confidence till we have tried them thoroughly. We are like the old dame who bought a raven to see if it would live a hundred years. Certainly the Norway Spruce, in most situations, has thus far grown finely; yet of the two oldest specimens I know, planted in Madison county in 1839, one is now dead, and the other not entirely healthy. Perhaps, however, the sap-sucker has affected their health more than other causes. An European Larch planted in 1840, and a White Pine in 1838, in the same county, are thus far thrifty. But of Scotch and Austrian Pines we have, so far as I know, no experience of equal duration. Hoopes says he has seen the Austrian succeed in a sour soil, where the White Pine failed; but I have not verified this experience.

In conclusion, I submit, from the report of the last meeting of our State Board of Equalization, a statement of the Assessor's reports of acres of orchard and woodland in the different counties of Illinois:

		Acres Orchard.		*Acres Woodland.*	
1.	Cook	2,579		20,987	
2.	Du Page	5,336		20,343	
3.	Lake	2,191		54,610	
			11,106		95,940
4.	Boone	1,784		21,510	
	De Kalb	4,177		22,617	
	Kane	2,912		30,798	
	McHenry	3,603		64,206	
	Winnebago	2,877		26,853	
			15,353		165,984
5.	Carroll	2,875		41,750	
	Jo Daviess	7,791		107,373	
	Ogle	4,074		67,852	
	Stephenson	4,043		50,925	
	Whiteside	3,726		22,735	
			22,509		290,535
6.	Bureau	5,898		31,922	
	Henry	4,054		14,144	
	Lee	5,583		12,961	
	Putnam	1,299		37,887	
	Rock Island	2,831		12,246	
			19,665		109,160
7.	Grundy	2,269		9,467	
	Kendall	.....		.....	
	La Salle	5,424		49,032	
	Will	4,196		24,048	
			11,889		82,547

		Acres Orchard.		Acres Woodland.	
8.	Ford	1,669		2,923	
	Iroquois	6,017		25,000	
	Kankakee	1,449		5,811	
	Livingston	4,385		5,710	
	Marshall	4,268		33,754	
	Woodford	3,184		62,227	
			20,972		135,425
9.	Fulton	5,417		140,141	
	Knox	5,735		58,322	
	Peoria	3,138		29,587	
	Stark	1,550		8,926	
			15,840		245,976
10.	Hancock	7,184		88,512	
	Henderson	1,688		37,815	
	McDonough	3,741		54,702	
	Mercer	3,073		18,396	
	Schuyler	2,769		77,275	
	Warren	2,874		17,043	
			21,329		293,743
11.	Adams	9,128		143,651	
	Brown	1,944		63,515	
	Calhoun	2,441		61,653	
	Greene	.....		.....	
	Jersey	1,989		105,532	
	Pike	5,704		126,768	
			21,296		501,119
12.	Cass	1,396		63,991	
	Christian	4,039		51,913	
	Menard	4,061		48,538	
	Morgan	3,025		80,000	
	Sangamon	4,693		52,480	
	Scott	1,342		30,113	
			18,556		327,035
13.	De Witt	2,736		29,070	
	Logan	3,460		32,370	
	Mason	1,479		41,750	
	McLean	.....		.....	
	Tazewell	2,644		8,714	
			10,319		111,904
14.	Champaign	9,192		26,443	
	Coles	3,717		54,289	
	Douglas	2,031		19,889	
	Macon	2,456		13,241	
	Piatt	1,513		5,109	
	Vermillion	3,665		37,237	
			22,574		156,208

		Acres Orchard.		*Acres Woodland.*	
15.	Crawford	1,881		93,836	
	Clark	2,135		119,164	
	Cumberland	1,205		23,876	
	Edgar	2,416		50,421	
	Effingham	1,178		82,527	
	Jasper	1,676		125,166	
	Lawrence	2,676		97,401	
	Moultire	1,819		46,316	
	Shelby	3,506		82,629	
			18,492		715,336
16.	Bond	2,633		64,922	
	Clay	2.626		116,870	
	Clinton	3,400		55,641	
	Fayette	4,881		168,145	
	Marion				
	Montgomery	3,458		68,383	
	Washington	3,943		127,630	
			20,941		601,591
17.	Macoupin	5,438		128,919	
	Madison	10,910		95,780	
	Monroe	1,404		127,314	
	St. Clair	6,441		111,687	
			24,193		463,697
18.	Alexander	153		81,763	
	Jackson	3,400		150,569	
	Johnson	2,180		151,377	
	Marsac	1,430		101,801	
	Perry				
	Pope	1,852		60,976	
	Pulaski	2,095			
	Randolph	2,352		56,874	
	Union	5,412		132,100	
	Williamson				
			18,874		740,490
19.	Edwards	1,284		72,975	
	Franklin	2,118		90,192	
	Gallatin	996		136,386	
	Hamilton	1,555		179,362	
	Hardin	7,644			
	Jefferson	2,217		135,998	
	Richland	2,474		8,549	
	Saline	2,298		159,474	
	Wabash	1,165		69,853	
	Wayne	3,506		213,306	
	White	1,537		187,351	
			26,794		1,252,546
	Total		320,702		6,289,236

From this report, which I received since this paper was begun, it will be perceived that although the amount of woodland in Kendall, Greene, McLean, Marion, Perry, Pulaski, Williamson and Hardin, is not given, that we have over a million acres more woodland than reported by the census of 1870. The Assessor's report should include all woodlands enclosed or not. Adding the acres here reported of woodland and forest and the acres of woodland assigned the counties first named, in 1870, we have the following result:

Acres Woodland, 1873	6,289,236
" Orchard "	320,702
" Woodland in Kendall, etc., in 1870	452,137
	7,062,075

Nearly twenty per cent. of Illinois territory, at the lowest estimate, may therefore be reckoned as in trees of some kind.

I would call the attention of the Society to this first enumeration of our orchards and woodlands by the Assessors, with the hope that they will use their personal influence to secure accurate returns, so that we may know from year to year the progress our State is making in the two very useful branches of fruit growing and forest culture.

Respectfully submitted.

W. C. FLAGG.

MISCELLANEOUS.

Prof. E. S. Morse, of Salem, Mass., being present, was invited to address the meeting; which he did for about fifteen minutes. His theme was the fertilization of flowers as effected by the agency of bees and other insects; which he showed with great clearness and facility, both by his descriptions, and by rapidly-executed illustrations upon the blackboard. Among other interesting facts, he described and pictured some varieties of flowers which could not be fertilized by any other known agency except the insects; and in case of some of the Orchids, one species of insect only, of a peculiar formation, could get access to the flowers so as to accomplish the work. This insect breeds and lives in and upon the plants. But no description of this brief, interesting lecture can be made intelligible without engravings of the illustrations which accompanied it.

The thanks of the Society were unanimously awarded him for his instructive entertainment; and at five o'clock the meeting adjourned until half past seven.

FIRST DAY.

EVENING SESSION.

At the hour of half past seven, the Society re-assembled.

A. G. HUMPHREY was, by vote, invited to read a paper which he had prepared "upon an important subject connected with the work of this Society."

He read as follows:

THE DESTRUCTION OF FORESTS, AND THE NECESSITY OF GOVERNMENT AID IN FOREST CULTURE.

Much has been said by horticulturists and agriculturists, and much has been written in horticultural and agricultural journals and papers, on the necessity of individual effort in the planting and culture of forest trees.

The importance of timber belts for the protection of our horticultural interests, has been well and thoroughly discussed; so, also, has the necessity of keeping a proper balance between the cultivated and timber districts, to secure a more equable climate, and the retention of sufficient moisture in the soil. Doubtless these efforts have accomplished something in securing the interest and work of individuals in forest culture. But nothing to compare with the immense destruction of our forests, by which thousands of acres are annually denuded of a luxuriant growth of timber.

There is a swift-approaching scarcity of timber, growing out of its increasing legitimate uses, and its reckless waste; and divided effort, however general, can never keep up the supply. Our only hope is, that the General Government and the State Legislatures will give this subject the attention that its magnitude demands.

It is truly a common-place theme; but no one can dispute the fact, that in no very distant future, it will become the great economical question of the day.

We have taken pains to collect some facts, that show very plainly the course we are drifting. Mr. James Little, of Montreal, says that the people of the United States will, within the next ten years, use up all their pine, spruce, and hemlock timber, east of the Rocky mountains. These supplies are chiefly found in Maine, New York, Pennsylvania, Michigan, Minnesota, and Wisconsin. The supply in Maine is nearly gone, and the people are now using spruce as small as six inches in diameter. Pennsylvania uses up 500,000,000 feet of her diminishing stores every year, and her remaining stock will be gone in five years. Northern New York, which has furnished 300,000,000 feet annually, is likely to be appropriated by the State for a public park, when the supply from that source will at once be cut off. The draft upon Michigan last

year, owing chiefly to one great fire, rose to the enormous figure of 2,910,000,000 feet. This year it has reached 2,000,000,000. Mr. Little avers, that during the next twelve years, judging from the past, this country will require 70,000,000,000 feet of lumber, and that we have not more than one-half that amount remaining in the woods. Canada already is supplying us with large quantities, but all she has east of the Rocky mountains would not last us three years.

These figures are still more alarming by adding a quotation I made last winter, in an article on forest culture (for the Northern Illinois Horticultural Society), from the monthly report of the Department of Agriculture, of December, 1870. It is there estimated, "that one hundred and fifty thousand acres of the best timber is cut every year to supply the demand for railway sleepers alone. For railroad buildings, repairs, and cars, the annual expenditure in wood is thirty-eight million dollars. In a single year the locomotives of the United States consume fifty-six million dollars' worth of wood. There are in the whole country more than five hundred thousand artisans in wood; and if the value of the labor of each is one thousand dollars a year, the wood industry of the country represents an amount of nearly five hundred million dollars per annum."

These figures are truly alarming, and bring before us a great practical question, which should engage the earnest attention of our State Society. The facts are before us, and we can see the danger that threatens our beautiful country.

The pages of history point us to the fate of foreign countries, that were once as fruitful and powerful as our own. In Palestine and Persia, for instance, the timber has not only disappeared, but civilization has gone with it. The populations have gone back into barbarism, and the land has become a prey to desolating famine. In ancient times, these regions were noted for their fertility; but with the disappearance of their forests, the whole face of the country has been changed, and equally changed is the character of its population. It is said that "history repeats itself;" hence the imminent danger that threatens us if our forests are to continue to fall before the woodman's axe.

There seems to be but a slight difference between solar effects on an open field and upon a forest; yet in that difference, slight as it appears, is involved the mighty law of climatic change, that has converted the populous lands of the old world into inhospitable deserts, and which scourges with water spouts, tornadoes, droughts, famine, and pestilence, the people of any country who violate it. It is readily observed that the snow disappears in the open field before it does in the forest; yet who thought to find here the great law of compensation, which prevents the land from deteriorating into a parched desert on the one hand, and keeping it from becoming inhospitable by accumulated snows on the other? but a careful observation of facts shows it to be so.

The climate of Northern and Central Europe has been greatly ameliorated in the last two thousand years. Varro speaks of the climate of Southern France as being unfavorable to the growth of the vine and

the olive. Virgil describes the Crimea as being subject to the rigor of an eight months' winter; Diodorus Siculus narrates how whole armies crossed the frozen Rhine; and other ancient authors bear similar testimony. In Europe, the change is attributed to the clearing up of the forests, and exposing large areas of land to the direct action of the sun. Similar changes are taking place in our own country. The early settlers of New England and Virginia speak of the severity, length, but equability of the American winters, which is quite different from their comparative mildness, shortness, but extreme variability now. "Then, when spring came, it came to stay, and not as now, to relapse suddenly back to winter." It would not be a very great stretch of the imagination to suppose that the severity of last winter was caused, to a great extent, by the loss of our forest on our northern border.

One of the first calamities that is sure to follow the destruction of the forests, is a dearth of water. Interesting and valuable facts, bearing on this subject, appear in the report of the recent congress of land and forest cultivators, held at Vienna. It says that the summer low water mark of the Elbe, in 1837, showed a diminished supply, in half a century, of ten feet. The Rhine and Oder have likewise declined. In the old world, many rivers have entirely disappeared, or shrunken to little streams. In Palestine the springs are dry, and the Jordan is four feet lower than in former days. Greece has suffered severely from the fall of her forests; in Hungary the drought is periodical; Sardinia and Sicily have lost their ancient fruitfulness. On the other hand, there were formerly but five or six days of rain during the year in the delta of Lower Egypt; but since Mahomet Ali planted some twenty million of trees, the number of rainy days is forty-five or forty-six. Ismalia, upon the Suez canal, was built upon a sandy desert; but since the ground has been saturated with water, trees, bushes, and plants have grown, and with the appearance of vegetation, the climate has changed. Four or five years ago, says the report, rain was unknown in these regions; but in the year from May, 1868, to May, 1869, there were fourteen days of rain. So, also, near Trieste, a finely-wooded district was destroyed by the Venetians, and twenty-five years ago, rain had ceased to fall; but to save the country from total abandonment, the Austrian government planted several million of olive trees. The very soil was conveyed in baskets, and with care the trees took root and thrived. It is stated, also, that the conversion of the desert of Utah into a blooming country has raised the Salt Lake seven feet above its old level.

Similar facts are observed in our own country. Already, in many parts of New England, there is a serious decline in the supply of water, and the value of trees for something else than lumber and sugar is making itself plainly felt. The volume of water in the Ohio, is stated in the report of the congress, to be evidently diminishing. The same is true of the Hudson, upon which the extent of navigable water is yearly receding,

With such on array of facts, every lover of horticultural pursuits, and, in fact, every lover of his country, should set himself to the work of planting trees, or lend his influence to promote forest culture. If we can

awaken in the minds of the great masses of our people a just appreciation of the urgent necessity of this work, very much might be accomplished by individual effort.

It is said that the wife of Thomas Hamilton, the Earl of Haddington, who possessed fine horticultural tastes, planted with her own hand and succeeded in raising several ornamental clumps of trees, and finally persuaded her husband to inclose and plant the Moor of Tyningham, a waste common of about three hundred Scotch acres. The Earl agreed to her making the experiment, and to the surprise of every one the moor was rapidly covered wirh a thriving plantation, that received the name of Binningwood. The Earl, pleased with the success, entered with great eagerness into the plan of sheltering and enriching the family estate by plantations of timber. He planted several other pieces of waste land, inclosed and divided his cultivated fields with strips of wood, and even made a tract along the sea shore, called the "east links"—which had always been regarded as a barren sand—productive of the finest firs. But it is certain that, however generally we might induce individual effort, we cannot avoid the threatened calamity unless Government comes promptly to the rescue.

The General Government should organize and establish a department of Forest Culture, similar to that of Agriculture, and every State should establish an auxiliary department, and secure a working committee in every county in the State; so that in the annual report of these departments this subject will receive the attention that its importance demands.

Government, too, should exempt every acre of growing timber from taxation, under certain govermental restrictions, and arrange and systematize a plan to plant and protect timber on all our streams and rivers, sea coasts, mountain sides, and rough districts, and establish such regulations of individual ownership of these "guardian forests" as shall make them valuable investments. Government should also see the wisdom of international action, and do her part in securing, once in a certain series of years, a congress, similar to that recently assembled at Vienna, to secure international agreement, and arrange international work for the successful prosecution of this most important branch of industry for national wealth and safety.

If Government can be aroused to this work, and put forth her strong arm for her own protection and security against threatened danger, we can look forward to a bright and promising future. The best men of the nation should be chosen for this work, and every inducement possible offered to stimulate individual effort. We may then expect to see in the not very distant future, millions of acres of land that is now comparatively barren and unproductive, covered with beautiful groves of deciduous and coniferous forest trees, leaving the richer and protected districts for the cultivated field, the orchard, and the vineyard. The earth thus clothed with garments of green, the great law of climatic change and the law of compensation will be so completely under the control of man, that in place of the present sudden changes and consequent devastating storms, we shall secure an equable climate, and frequent gentle showers, causing

the earth to yield in the most profuse abundance her rich productions of timber, grains, and fruits for the uses of man.

DISCUSSION OF DR. HUMPHREY'S ESSAY.

C. V. Riley—I begin to feel like protesting against these essays which give us but one side of any question. I have listened to numerous essays on this subject, where whole arrays of figures and facts, or what purport to be facts, are brought forward, and not a word said on the other side. We have been told for the last six or eight years, that within ten years we are going to be without timber in this country; and yet as that time approaches it is put off again. All these essays have, to my mind, been exaggerations of the truth. There is a reaction in this matter. No less an authority than Mr. Meehan has taken up the argument on the other side, and I think that Dr. Warder conceded to me, before he left for Europe, that the statements were not always reliable.

The great impediment to cultivation in Virginia is the prevalence of timber. Go through the Eastern States and there is no lack of forests, and I dare be bound to say that in the State of Illinois, however much the planting of trees may be desirable, there are more trees growing to-day than there were twenty or thirty years ago.

Take the Atlantic and Pacific road, if you will, and see the immense amount of timber that is growing everywhere. I cannot see, for the life of me, after examining this question very candidly, that forests affect the climate a bit. We talk about the drought of a few years past having been induced by the want of forests. Why not say that the wet seasons we have had were the result of the same causes?

I believe that every field that is plowed is a far better conductor of moisture than trees. Mr. Meehan claims that there is less water in the ground under forests; that the water runs off more easily when covered with forests than it does when plowed and tilled. I think, if you will look at meteorological tables, you will find that just as excessive droughts must have taken place in years gone by, when the timber must have been more plentiful, as take place now. In some of the States, where timber is being cut all the time, regardless of consequences, there is some chance of their not having the same supply they had before, because that "it is difficult to grow the same kind of timber after it is once cut down," may be true, but that we shall lack for timber in the next century is what I do not believe. While I would have trees planted for ornamental purposes, for use as timber, and for fruit culture, still I do protest against thus

making us fear for the future. What we want is facts—truthful representations—presenting both sides of the question.

C. W. GREENE—I think the professor is decidedly wrong when he speaks of the supply of timber holding out for any length of time, and I speak of it now in the Southern States. I have had some experience in gathering timber through a portion of that country, from Columbus, Kentucky, to Mobile, Alabama, 470 miles, through a country which a few years ago was entirely covered with timber, and you cannot find on that line of road to-day but very few places where there is a tree left suitable for mill purposes. Immediately after the war I had occasion to re-build 155 miles of that road, a road which had not been operated through the war, and going through the most magnificent timber country I ever saw; and yet, though the road has only been built eight years, and for four and a half years during the war had been lying idle, we had to haul all our tie timber from half a mile to a mile—as far as it was profitable to haul it.

The Mississippi Central road, the whole length of it, is almost denuded of timber for useful purposes.

They are now talking of laying narrow gauge tracks to reach the timber, which is on the rivers. All the oak timber, within several miles of the Tennessee river, has been cut for the manufacture of stave timber, and all that I know of this country is that the timber is being rapidly used for manufacturing purposes. The manufacturers of Illinois to-day—the Moline Plow Company and others—are drawing their supplies of oak timber from western Kentucky and western Tennessee, because their supply nearer home is exhausted. These are facts that I know of my own knowledge.

There is probably no crop to which our attention can be more profitably devoted than to forest timber, *as a crop*, and simply as a crop.

Now as to the effects of forests on the soil: If Professor Riley will ride over any of the Southern States and notice the condition of the land where the timber is taken away, he will see it entirely exhausted, and the result is that the farmers are turning out their old lands, and clearing new lands to use in the same way. Then, again, these old fields are washing into gullies, and getting into such a condition that it will be impossible to restore them. It is the case in Virginia, Alabama, and Tennessee, and all the States where I have been.

Now take the Southern Yellow Pine region: We know that it is being exhausted very rapidly—that mills have been torn down and

moved, denuding one section after another until you can scarcely find any timber within a reasonable distance of the navigable streams or rivers. These are the conditions, and I think there is apt to be as much exaggeration on one side as the other. Certainly there is as much danger, or more, in exaggerating the actual supply, as there is in underestimating the quantity you have to use hereafter.

Mr. Riley—I made my remarks more especially with reference to the effect of forests on climate. I do not deny that we are using immense quantities of timber throughout the country, nor would I care to refute a single fact that he has stated, but I will ask whether along these lines of railroad the young forests are springing up all over if let alone; whether the tree growth is stopped or not?

Mr. Greene—Nearly the whole of that land they take for cultivation, and they are exhausting it as they have done the abandoned lands.

Mr. Riley—If the land is treeless, has there been any change in climate?

I only objected to the essay because it brought only one set of facts forth, and I saw there was no one who was going to call attention to it. While I do not deny that timber-raising will become profitable in years to come, still I deny that there have been any effects of a broad enough character to warrant us in believing that the denudation of our forests, as it has gone on for the last two hundred years, has had one bit of effect on the climate. If anything the climate has been improved in the Western States, and I do not think it has gone worse in the Eastern States. There is less water, probably, all over the country. Now along the line of railroads; how very narrow a portion of the country do these railroads occupy after all. Where I have been in the Southern States, I have seen the forests abundant, even on the lines of railroad.

Mr. Flagg—The point, as I understand, is something like this. If I understand the arguments of Mr. Meehan, which were made, I believe, as against Mr. Hobbs (and it is, further, the argument of Mr. Draper of Central Park), their arguments are directed to this point—that there is just as much rain-fall now as there ever was. I respectfully submit that that is not the question. The question is, whether the extremes are not greater than they used to be?

Now there is a certain amount of cold that you may throw out of consideration—that is, so long as it does not affect vegetable growth. When you get below that, it will be important to look into it. I am perfectly willing to admit that the same causes that one hundred years ago

produced a certain amount of rain-fall will do the same now. But I think the extremes are greater. I think our apple trees have been damaged more by excessive rains and succeeding droughts than was the case fifteen or twenty years ago. I think for the last ten years the maximum cold for January has been greater than for any other series of ten years. Last winter we had the cold at minus 27°. In 1864 it was minus 25°. These points were not reached at any time back of that, unless it was in 1831 and in 1856 or 1857. There are three periods, almost, of ten years in which there has been intense cold.

I think the same holds true of heat. There has been a greater variation between the extremes, while perhaps it did not affect the means. Now I should like to see Meehan or Draper attend to that question, because I think it is a practical one.

The question is asked by a correspondent of Meehan's—"Do our trees live as long as in Europe, or can they?" And Mr. Meehan says—"No. The oak may live one hundred years, and then it would decay in a hundred." I have no doubt he is right in that.

I made a translation, the year before last, of the observations made by Mr. Matthieu, at Nancy, France. He measured the rain-fall at two points six miles apart; one in an almost treeless, farming country, and the other in a small opening in a large, dense forest. The result of his observations for two years and eight months showed a difference of several inches of rain-fall in favor of the forest. The experiment was tried, for the same time, of measuring the rain-fall directly under the trees; and it was found that even there, besides the amount held by and evaporated from the leaves and bark, there was more rain reached the surface of the ground than in the open ground at the distant station. Then the evaporation in the open location was four or five to one.

Now, while forests may not have an effect on rain-fall, taking country at large, yet they do have an influence. In these cases, I think Mr. Meehan would acknowledge that the forests gained at the expense of the open ground. That is very likely true; but as to evaporation, I have no doubt that forests have a direct effect. That, to my mind, is a great argument in favor of tree planting in this country; but we have not yet got sufficient facts from which to draw full conclusions.

MR. GREENE—Professor Riley asks if the average of rain-fall is affected by the destruction of timber?

The question is, that while the average may be different during different years, yet we all know that as the soil becomes less fertile, it

becomes more subject to drought; it dries quicker, and becomes baked sooner.

Now, you may restore many of these old fields by turning them into clover fields, but what I submit is, that virtually restoring some of them does not affect, nor is it affected by, the forests you have. Is not a field of corn somewhat similar to a forest in gathering moisture from the atmosphere and precipitating it? The idea I wish to convey is this—a field in foliage crops will have the same effect in retaining moisture as the forests do. If that is so, and it was all, then the removal of forests would not be objectionable. But these fields become worn out, and the soil being baked hard, the water that falls upon them runs off; as the water records show, along the Mississippi, the rise and fall is quicker each succeeding year than it was before. There is a fact to be guarded against. Is it not best that this land, which is being lost to cultivation, should be devoted to forest growth, then? This denudation and compacting of the soil by cultivation is the cause, I think, of the waters going to the rivers, and giving us a less supply in springs than we otherwise would have.

Mr. Riley—If not thought tedious, I will reply to one or two of the points mentioned. Any crop has some effect on the climate, so far as the moisture is concerned. Forests, and even fields, when neglected, will soon be overrun with weeds, and they will have the same effect as forests; and if the experiments of the French philosopher are to be relied upon, they are valuable, for I would rather take a few exact experiments, founded on proof, than all these ideas and theories.

Mr. Flagg—Have you looked into these experiments of Mr. Knott?

Mr. Riley—Not very closely.

Mr. Flagg—They are exact.

Mr. Riley—I am not prepared to say but that the rain-fall may be more evenly distributed; but I rather expect, without being posted on the topography of this subject, that it would not be. In passing over the country, I notice that the more thickly a country becomes settled, the drier it becomes. I recollect that, in Kentucky, I have walked through sloughs, where you would have gone in skiffs a few years before. Why does it become drier? Because men drain the land, and the water is carried to the rivers and thence to the ocean much more rapidly than it was before. I do not think it can be so easily attributed to diminution of forest trees.

I have traveled over tracts where the timber has been denuded, and seen the young growth coming up pretty fast. Look at the changes that

have taken place in a hundred years; yet there is almost as much timber now as there was then. There is almost as much timber made every year as there is used in manufactures, and for all other purposes. I am not at all enthusiastic in this matter, but I have become almost wearied of listening to essays where the same old truths are brought forward at every meeting of this Society, and in the societies of other States. I say that I have become impatient. There is another side to the question, and horticulturists ought to attend to both sides.

MR. FLAGG—While it is true that this man has made a report which recommends tree planting, yet I would ask whether it is not a fact that, for climatic reasons, the great majority of authorities are strenuous in favor of tree planting?

MR. RILEY—Most assuredly they are in favor of it, but not for climatic reasons.

A merchant of Carthage, Mississippi, sent me meteorological data from 1833, taken at Natchez, and there is nothing in them to show that during that time there was any particular change, and while these records show that we have had some excessive droughts, there is nothing to show that it is exceptional, when taken by the record. You can remember the floods of 1844, I think, and when Mr. Greene speaks of the Mississippi overflowing, I would say that our records do not extend far enough back.

MR. WIER—I feel something like Mr. Riley—that we should have both sides of the question. I have listened to all that has been written and said on this subject, in our Society, for a number of years, and have been waiting to hear some one hit the nail right on the head, and I do not think they have done it yet.

MR. FLAGG—There is your chance. [Laughter.]

MR. WIER—I know this country is drier than it was thirty years ago. Our creeks rise a great deal faster and fall a great deal faster, and the water runs off the country everywhere faster than it did. It is not because the country has been denuded of forests, and it is not because it has been plowed up. That has nothing to do with the question. I know of thousands of acres on the Illinois river bottom where, thirty years ago, a man could not cross on foot, and he may walk now on firm ground. The cause is the tramping down of the country by cattle, making the ground firmer, so that the water will go off. A blade of grass two feet long can throw out more moisture than one two inches long. The country was everywhere covered with a mass of vegetation; there was no spot left uncovered, and that great mass of vegetation held water, and it reached the

earth slowly. Now it runs right off. That, I think, is the reason why we have more sudden changes now than formerly. I think there is as much water falls in Illinois now as forty years ago, but it runs off more rapidly. The Illinois river was lower thirty years ago than it has ever been since.

Mr. Riley—Would you not admit that the artificial system of drainage does the same as that?

Mr. Wier—There are a great many things that may have some effect. Once there were many miles in our neighborhood where the cattle could not pass through the creek bottoms. This country has been settled, and tramped by cattle; now you can pass through, and you would not think there was ever any swamp there at all. Then the cattle covered up the mouths of the springs with their tramping. I recollect one place, near our house, where there was a good spring, and it gave out, and the family thought it had gone dry. This year they were plowing the ground, and struck the vein of water, and it came right up again.

SPECIAL COMMITTEES.

The President announced the following committees:

President's Address—L. C. Francis, S. G. Minkler, A. A. Hilliard.

Auditing—E. Daggy, I. Snedecker, W. T. Nelson.

Fruit on Exhibition—S. G. Minkler, W. H. Mann, H. C. Graves.

Final Resolutions—H. H. McAfee, W. C. Flagg, Smiley Shepherd.

DISCUSSION RESUMED UPON METEOROLOGICAL INFLUENCE OF FORESTS.

Mr. McAfee—I am glad that the other side has spoken. I am glad the nail has been hit on the head. I am glad Meehan wrote the article he did, and published it; because this thing *was* getting monotonous and wearisome. Tree planting was getting popular—even politicians were going into it. Now that we have a mark to aim at—a position to fight against—those who have Scotch blood in their veins will feel like buckling on their armor.

I did not hear the essay which is the subject of discussion; but as I understand it is *pro* or *con* whether the forests have an influence on rainfall, and whether they have a meteorological influence.

Now there are a great many points in this discussion on which we do not differ at all. There is this point—about the action of civilization in regard to stock. There is this point—about culture—and the question

whether field crops have the same effect as wild verdure. There are a thousand and one questions bearing upon the general question, which ought to be discussed and thought about, and which receive only the slightest attention. A little discussion, I think, will be good; it will bring the matter more prominently before the people; it will make them draw comparisons more than they do now.

I wish to disagree *in toto* with the views of Mr. Meehan. My respect has always been large for him as a man of intellect, but I do think that article is the weakest one I ever saw from his pen. I thought he had some weak opinions when he first came out on grass culture, but this is far weaker. He has actually picked out a single year and given us the rain-fall. He refers to that year and another, and to them only. What kind of a scientist is he who takes as a basis an individual instance where they vary so much as the rain-fall in different years does? We can say "this season was a damper season than that," and this about all we can say; but if we had the data gathered by naturalists everywhere—from St. Louis, which is under the influence of that great river—from the Atlantic coast, and from the Pacific coast—and over the great plains—for a series of perhaps one hundred years, then we might have some true basis to build upon. But unfortunately we have not that; we have to trust to our personal experience and observation.

Now I want to speak on a few points. Suppose a piece of original land, just as it was in a state of nature, with the ground only disturbed by such wild beasts as pass over it occasionally.

First—The condition of that forest, with the leafy screen overhead, was such that just beneath the heads of the trees was a stratum of air, enclosed and kept quiet. The rapid flowing winds outside could not pass through this forest.

Secondly, the moisture was longer retained there than on the open land.

Now, you know, all of you, that during the season of vegetation, our deciduous trees are giving off moisture at a rapid rate. Tons are being thrown into the air. The air is continually obtaining moisture from these trees, and will any one say that they have not an effect on the atmosphere, in the way of moisture?

Under that damp atmosphere lies what? The debris from the trees —fallen leaves, particles of shedding bark, etc., undergoing a slow decay. When a drop of water falls there, it is held there as in a sponge, indefinitely—soaked out, absorbed, evaporated, or filtered through it. That being the case—the decaying verdure being a layer of sponge to contain

water, and the atmosphere being charged with moisture above—these two things will quickly show any one why that country is damper in its atmosphere and surface than it would be without that forest.

Now let us go on downward. Some rain falls on that forest, and some finds its way to this spongy mass of earth, and is retained for a while, and gradually goes down, down, down. You may say that the moisture passes into the roots of trees so much that it leaves the soil dry. How does it get into the roots of trees? There is a principle involved there—a very fine one, too. The roots are not open mouths, sucking up moisture out of the earth; they are closed cells, with no opening to be seen in them, and the moisture that passes into them passes in on the principle of osmose absorption, and that tree will not remain turgid, and in the highest condition of health, unless there is moisture in the earth to absorb. That osmose absorption ceases, to a certain extent, whenever the amount of moisture falls below a certain point. We can find forests in such a condition that in many places the soil is powder dry. These are suffering for want of moisture; and if you ever dig down into the forest, and find the soil dry and dusty where the roots are, that forest is suffering.

Under these circumstances, just one thing must happen—the moisture which goes into these trees, and which is essential to their healthy growth, and even life, must ultimately all come from the atmosphere. Whether the tree takes it from the earth through the absorbing root surface, or directly from the air through leaves and bark, it still must come from the air as rain or dew, or as invisible gas.

And as the presence of these trees necessitates a greater supply of moisture from the air than would be necessary for an herbage crop, so if trees live and thrive, their very existence proves that a larger sum of moisture is being deposited from the atmosphere at that point than would be deposited were they absent.

The remark has been made that vegetation does not fix water. Surely this is an error. The growing plant is but a laboratory, wherein the inorganic simples are worked over into organic compounds, or where the inorganic compounds are broken up and recombined under the dominance of that mysterious principle—the vital force. Trees are making cellulose, lignine, starch, sugar, oil, resins, gums, etc., in which are the elements carbon, hydrogen and oxygen. The carbon is derived from the carbonic acid gas of the atmosphere, while the hydrogen and the oxygen come mainly from the water. Here, then, in the wood, bark, and the various products of the vegetative function, the tree has been fixing

water as a part of some organic solid. The water, which is given off in the combustion of any organic substance, has once been made water before, and such combustion may be regarded as the undoing of the work which the vital force has done. Considering the part which the moisture of the atmosphere must take in all forms of vegetation, how can we say that the larger plants, such as trees, have "no appreciable meteorological influence?" They must absorb, and they must excrete immense volumes of water, else the economy of their circulation, upon which their life depends, would be destroyed. They must use a great deal of water as an ingredient of the substances which make up their mass; and all this water must come from the atmosphere. In the life story of a tree is found, then, a better argument for the meteorological influence of forests than you can find in your rain gauges.

And now let us look at these observations, upon part of which Mr. Meehan has predicated his attack upon the meteorological influence of forests. At what points have they been taken? Why, just where certain peculiarities of the location would indicate that the rain-fall would decrease, rather might increase as forest denudation proceeded in the whole country. Two points are mentioned in the timbered trough of the Mississippi river—Natchez, and St. Louis; and Mr. Meehan's points are clearly within the influence of the Atlantic ocean and its tributary waters. The Smithsonian Institution also is located between the Potomac and Delaware bay. It is generally held, and all observation proves it, that bodies of water exert an attractive influence upon rain storms; and whether we think we know why they do so is not pertinent to our inquiry. Again, ridges and ranges of high lands exert an attractive influence upon certain kinds of storms. But who of our learned men has told us that hollows, troughs, depressions of the general surface, attract storms? And yet, have you not seen the masses of cumulus clouds which go to make up one of our summer thunder-storms, when advancing over the plains of Eastern Iowa and approaching the trough of the Mississippi, gradually increasing their down-pour, till when over that timbered trough the rain was many times heavier than before, and the storm seemed to linger as if loth to move on in its eastward course, and when it finally drifted away from the Mississippi, over the high plains of Illinois, the rain became very much lighter? The phenomenon may be seen every summer, by an observer stationed at a proper point, and I have seen it often. Why the increased rain in that valley? I believe it is due largely to the timber of the valley acting with the water surface as attractors of the cloud masses. But valleys not timbered, though they contain rivers and lay at right

angles to the course of the clouds, do not attract rain. Witness the phenomena seen day after day at Denver, Colorado. There the storms, which organize upon the mountains to the west, pour rain until the clouds float over the valley, then hold up, and frequently not a drop will fall at Denver; but by the time the clouds have nearly reached the high ridge (Mera) east of Denver, they begin to pour rain as hard as ever. Why do not the storms approaching the trough of the South Platte act as those approaching the trough of the Mississippi do? The *timberless* Platte valley and the *timbered* Mississippi valley furnish the answer.

Common observation shows that the summer local rains follow timber belts when the belts depart but little from their course, and pouring and depositing increased rain-fall when the belts lay across the storm's course. People who observe see these things, and they conclude, most rationally, that forests do have an influence upon rain-fall, so it is no wonder this has become the popular belief. We have seen it on many a summer day, and many a prairie farmer has felt keenly in sympathy with his parching crops, while he has watched the coveted showers fondly cling to the groves or belts of timber, passing first to the right and then to the left, leaving his fields dry, until a more general storm, perhaps a cyclonic tornado, has given him not only rain but a deluge.

Unfortunately we have not the data of observations from properly selected points over the whole country, and extending over a long period sufficient to base calculations as to the general rain-fall upon. The fragmentary observations, adduced as proof, have no value as such except for the points where made, and it happens that those points are just the ones where a lack of rain-fall would not be likely to occur, even though the general rain-fall should decrease. But ocean is just as large as ever, and if we should make a desert of half our land the evaporation of ocean must be deposited somewhere, and thus decreased rain-fall over one area means increased rain-fall over other areas.

I believe a fair, unprejudiced consideration of all the facts and phenomena now known will warrant the belief that the forest denudation in parts of the United States has already affected rain-fall, while it has affected both surface and subterranean water distribution much more; but yet there is in the interest of science, as well as in the interest of economy, on urgent call for better, more perfect data from which to deduce a knowledge of this subject.

Mr. Riley—I agree with Mr. McAfee in some points. He cites some facts that would lead us to suppose that the coming down of the clouds is more the effect of forests than of any thing else. I could cite

you many facts which show precisely the reverse. Every summer, where I live, I can watch the clouds divide as they reach the fork of the Merrimac and the Missouri; part of them go one way and part another; yet that is a very thickly timbered country. The trite facts he mentions we all recognize. I have never denied the influence of forests as ameliorating temperature. If there is a moist atmosphere in the forest, it must have come from somewhere. The moisture comes from all the expanse of watery surface—whether sea or fresh water; and you know, as well as I do, that that watery surface is less to-day than it was in primeval days, when men did not till the soil, and so also there is less radiation.

Now, if in my argument I have said any thing that would at all reflect on the essayist, he will pardon me. I simply had the object of bringing out this discussion. I have paid very little attention to the subject, but I know that we could argue this question for a whole day.

We want facts—unbiased facts—we must not be misled by the public statements, without reflecting upon and testing them. It is for that reason that I put in my protest. There is too much copying of each other. I must confess that seven or eight years ago, I believed in this wonderful disaster that was coming over our country from the denudation of our forests; I believed all that was said. But from what I have since thought, I have been led to a different conclusion. If, from the remarks made, any thing shall be done, I shall be well satisfied.

Mr. Flagg—I believe that I could prove that radiation and evaporation go on more rapidly from the cultivated country than from one that is not cultivated. It is said here that they are both the same. Now, I deny that *in toto*. Your corn fields do not protect the ground as grass or woods will do.

Mr. Wier—If I understood Mr. Greene, he said that our plants, grass, etc., were absorbing moisture from the air. I said they did not do it—they were continually throwing immense quantities of water into the air, which is the fact. Our forests won't grow in a dry soil; they dry out just because animals have tramped the surface down, so that the trees cannot get food. I know very well that trees fix a certain amount of water, but I am not going to say that they do it in the way stated.

I think there is great fault found with the place of meeting, and there are many here who would like to know if it is to be changed.

The President—The meeting will be held here at nine o'clock in the morning. At one o'clock there will be the exercises of dedication; then in the evening we meet at Eichberg's opera house.

The meeting then adjourned until nine o'clock of next day.

SECOND DAY.

MORNING SESSION.

The Society met and was called to order by the PRESIDENT at nine o'clock.

Prayer was offered by Mr. S. G. MINKLER.

THE SECRETARY then read the following communication:

CHAMPAIGN, ILL., Dec. 10, 1873.

Hon. M. L. Dunlap, President State Horticultural Society.

DEAR SIR—Allow me to extend to you, and through you to the members of the State Horticultural Society, a most cordial invitation to attend the dedicatory exercises of the new University building, to take place this afternoon, at one o'clock, in the auditorium, below the room in which you are in session.

Yours, with very great respect,

J. M. GREGORY.

On motion, the invitation was unanimously accepted.

MR. FLAGG stated that he had placed upon one of the tables a supply of copies of Reports of the Industrial University, and invited each member of the Society to take one.

The SECRETARY called attention to a quantity of Reports of the State Board of Agriculture, which had been sent by the Secretary of that Board, Mr. A. M. Garland, for a like purpose.

He also stated that he had bound copies of the Reports of the State Horticultural Society, of Vols. II, III, IV, V and VI, which would be sold at one dollar per copy; the money could be sent him, and the book would be returned by mail.

REPORT OF COMMITTEE ON BOTANY AND VEGETABLE PHYSIOLOGY.

H. H. MCAFEE, of the Standing Committee on Botany and Vegetable Physiology, presented and read his report, as follows:

VARIATIONS FROM PARENTAL FORMS IN VEGETABLE LIFE.

The enthuiasm of the amateur florist, as he witnesses the unfolding of a flower with a new and desirable shade of variegation, or a greater perfection of form than has been before attained, may be but little understood or appreciated by those persons whose tastes and sympathies have never taken the direction of floriculture; and the exultation, almost triumph, of the pomologist, whose labors have helped into being a new fruit of peculiar excellence in some desirable direction, may be and is

probably as little realized by most persons who know of the circumstance; but I feel sure that you, who are imbued with the spirit of horticulture, can well understand and clearly appreciate the value placed upon the fruition of a desired variation from the parental form in any department of your calling. Had organic life been built upon the principle of direct inheritance—had the All Wise discarded from his scheme of creation the principle of variation from parental forms (as so many of our most dogmatic scientists seem to think he should have done)—our world must have been, at best, but a purgatory of monotony—undesirable, unendurable. Think, for a moment, what would be the effect upon any mind, if it was steadily and continually directed to the contemplation of a passing chain, every succeeding link of which was fashioned an exact counterpart of its preceding fellow, and thus on, and on, the same picture, the same thought continually presented, without the relief of any variety? Such monotony would even unthrone reason in time.

The mind, directed to the contemplation of natural objects, is not thus afflicted with monotony. Change, variation, novelty ever appear to claim the attention, and to bestow present pleasure and a promise of future interest. The Master Builder builded all-wisely when he constituted the human intellect with its absolute requirement of variety, and then filled His world with variety and the possibilities of variation of all existing forms for the mind's nourishment. Prof. Agassiz and his school of naturalists insist upon the idea that a fair investigation of the phenomena of life proves the existence of a definite plan of creation in the mind of the Creator; and, except we are so presumptuous as to deny the plainest attributes of divinity in onr conception of the Creator, we must all agree that He did plan, as also He did execute, even from the dawning day of creation, all-wisely. His "plan" was so perfect that it embraced the element of variation from a fixed heredity, so faultless that the works which came from His hand "good" were capable of becoming, in consonance with that "plan," better. The hope for our calling rests in the possibility of improvement; and variation, as opposed to constant inheritance, makes improvement possible, and nourishes that hope.

We all wish for new forms, and better forms, in every department of vegetable life. Hence there is no part of the science of vegetable life which naturally possesses the absorbing interest for the progressive reasoner as does the subject of variations. How the variations we see have come about, is an ever present question, an always interesting question; and to what extent variations may be made to fulfill an intelligent design, and so be subject to our wishes, is a yet deeper, more absorbing question. For the purpose of directing thought toward these subjects, I have occupied such ground in my papers presented to this and kindred societies, during five years past, as seemed to me best calculated to provoke attention and discussion.

The object in view has been, I think, measurably attained. Many of our best members have sharply contested positions taken in these papers, and thus the interest of the subject has been heightened by contest, and

thought and study have ensued, and progress has doubtless been made in that course of self-education which is constantly going on in the naturalistic mind.

Some of the more prominent positions taken in the papers referred to may be briefly epitomized as follows:

1. Plants are creatures of habit; and it is largely to the force of habit that the constancy of form of wild plants is due.

2. Variations arise when the habit of a plant has been broken up by the application of some new condition of life.

3. The direction of a variation is determined by influences which have worked upon the parent to call forth new traits necessary to the well-being of the offspring.

4. Artificial reproduction—that is, propagation in any other way than by seed—is the most positive disturber of the habit of a plant, and will always, sooner or later, result in variations through the seed, and sometimes through the bud.

5. Hardships in the life of plants, if not too enervating, lead to variations in the offspring, suiting them to withstand such hardships.

6. Crossing leads to variations—that is, there is not only a mixture of the parental traits, but entirely new traits are apt to appear.

7. Variations become more and more pronounced the oftener they occur; the plant, after a time, varying habitually.

8. It is, to a certain degree, within our power to cause plants to vary in desired directions, so that they may be better adapted to special uses.

9. Our only hope of improving plants, by introducing new traits, is to act upon the young plant through its parents by making the parents suffer for lack of the traits we desire to have appear.

10. Variations by seedlings are more common than by bud, because every seed is a compound product of generation, while every bud is a single generative effort.

It is my wish, at this time, to consider some of the ways in which variations come about, and, in doing so, to apply the principles just laid down, and see how far they explain observed phenomena, and how far they account for otherwise inexplicable facts. We cannot proceed far in a subject like this, before we find ourselves away back at the source of life, witnesses, as it were, of the very act of creative power which gives every being a beginning of existence. We must study embryology, just as the evolutionists on the one side and the anti-evolutionists on the other side do when they seek to prove their respective positions. Whether the primary form of every living thing, plant or animal, is considered as a simple mass of nitrogenized matter called protoplasm, or whether all live things are supposed to spring from a single cell, called an egg or ovule, we must all agree that among the forms in which the simple cell, the first principle of plant life, appears, there are but two ways in which it may proceed to become an individual plant. Here, at the threshold of life, there is a fundamental distinction which divides all vegetable individualities into two grand classes. For convenience, let us name these classes "sexual"

and "asexual," meaning with and without sex respectively. Then follows the generalization, that all plants originate by the union of two elements of a different but compatible nature, or by the development of one single element. So far as we now know, the seed of a phenogomous (or flowering) plant alone fully represents the first or sexual class, while every bud represents the second or asexual class, as do also the spores of that immense division, the cryptogamia or flowerless plants, which, though they sometimes seem to show a low order of sexuality, are virtually, in our present state of knowledge, asexual.

A seed, as we see it, is but a young plant in a dormant condition, possessing within itself, or around it, stores of plant food, sufficient to start it well on in its young life. In the squash seed there is nothing inside the seed-coats but a plant with very large leaves and a very small stem and root, but for all that, a plant, and a plant only.

In the seed of corn there is a plant on the one side, and the balance and larger part of the mass of what we call seed is the stored food for the plant's use in its infantile or dependent state. In the pine nut there is, as you may see, a miniature pine tree, packed nicely away in the central axis of the store of food which is laid away for its use when it shall undertake life on its account. But in each of these cases the seed is plainly not the beginning of the new life, but only a halting-place on its way, adapted to tide it over the non-vegetative season of the year, or to continue its life without growth for a longer or shorter period. The beginning is really the confluence of two simple cells—the pollen cell and the germinal sack of the ovule. At infloresence, these two elements—which are called sexual, and which may either belong to the same flower, to separate flowers upon the same plant, or to separate flowers upon separate plants—are brought together by the wonderfully beautiful arrangements of the anthers, stigmas, and ovaries; and just here at this point of contact occurs the beginning of this composite, individual life—a unity and yet a compound. Only the higher orders of vegetable life, and the higher orders of animal life, have reached that perfection in the organic scale which is a prerequisite to sexual reproduction; and, as we descend to lower and lower organisms among both plants and animals, this composite reproduction gives way to the other or single reproduction, in which sex is obliterated, and the new life starts into being from the simple, infecundate cell. Growth, physiologically considered, consists of the aggregation of material and the multiplication of cells; and the asexual reproduction is then simply a form or growth in which a cell springs into being—as all cells do from some other cell—and then takes up a separate life and a complete individuality.

"Right here, where the simplest form of plant life, the single cell, stands upon the boundary between dead matter and vitalized matter, the two great organic forms, the animal and the plant, seem to meet. The simplest plant, the single cell, increasing and reproducing by gemmation or budding, and the simplest animal, a single cell also, increasing and reproducing by gemmation, are too nearly identical in nature to have been fully and clearly separated by human science thus far."

As we rise in the scale of organic life the asexual system of reproduction seems to gradually change into somewhat diverse forms; but it is retained even after the sexual reproduction appears; and it occurs as a means of extension in all large plants, whether spore-bearing or seed-bearing.

Every bud, whether appearing in the axil of a leaf or adventitiously, is an asexual reproduction, and has its origin in a single unfecundated cell, while it possesses its own individuality as clearly as if it were, what it may under proper circumstances become, a separate plant.

That the bud or the spore, the offspring of one parent, built up out of that one parent by a simple continuation of all the functions of growth of that parent, and only apparently beginning a new or individual life when detached, should copy its parent in every one of its attributes and traits of character, would seem a foregone conclusion. But long observation and experience have proved that even such closely related progeny as buds will occasionally depart from the forms and qualities of the parent, and strike out in a comparatively new course of life and development. It will not be necessary to prove, by adducing numerous instances, that bud variation exists; for every observing horticulturist knows of it, and has seen it. Seldom a season passes but what the flower border will produce clear and conclusive evidence of bud variation, although it is much rarer among the fruits, and still rarer among ornamental trees, while in plants which are yet in a state of nature it is rarest.

It must be some influence which works at the time of the formation of the original cell which is to become the bud, or antecedent to that time, that causes bud variation. Science ignores chance, and inquires for causes and effects; and here we seem to be forced to make a choice between but two probable causes: the one an act of special creation; the other, impressions upon the vital force of the parent. If we are weary of investigation, or afraid or incompetent to pursue research, we may relieve ourselves of responsibility by saying: "It was so made by Divine Wisdom," and let it go at that. But most of us do not care to rest at this point; for that wisdom seems to be most truly Divine which governs by perfect, original laws, rather than by special acts. The exact character of the impressions which may be made upon the parent, or how impressions are made upon the parent, we may not know; but there are both logic and an abundant array of experience to show that impressions upon parents do produce effects upon offspring. Witness the fact that unripe pea seed produced a variation in favor of earliness; and the fact that a change to a drier climate has given rise to young plants with restricted evaporative surface (dwarfed plants); and the fact that high culture and increased nutrition give us young plants with lustier growths, finer fruits, more gorgeous blossoms, and less hardiness. Even the wheat plant—not too prone to sport—if taken to the almost perfect wheat climate of the Pacific slope, soon develops into such wheat as we here dare not hope to produce; and then again, if that splendid grain be returned to us, it blights and rusts almost invariably, thus showing that its exalted and perfect state in the far West was reached at the expense of hardiness.

These illustrations are all taken from sexual reproductions, it is true; but I cannot perceive that there is any ground to doubt that the same principle applies in each case of reproduction, only differing in the degree to which the influences may act, as I will attempt to show hereafter.

The bud, considered as a young plant, and the spore as the initiatory cell of a young plant, have at their inception the one single parental element to govern and control them. The seed, as a young plant, has at its origin two elements which, from the fact that they are separate, may be to a degree diverse in their influences; hence it is plain that the incident of compound generation may be a disturbing cause leading to a variation in the offspring. How do the phenogamia (seed-producers) and the cryptogamia (spore-producers) stand as varying or as constant plants? Why, where there is one variation in a plant of the latter there are a million in the former. All of our domesticated plants, which may or do fertilize from separate plants, are thoroughly variable as a rule. Every fertilization in this case (from flowers upon separate plants) is, in a certain sense, a constitutional cross. The two parents could hardly be in exactly similar conditions, and under exactly similar circumstances, though they might be of the same variety; hence the plantlet with two parents has, from this cause alone, many chances of variability. But when we consider that both classes of reproduction exist in the same plant when it bears seed and produces buds, we shall see that greater disturbing causes yet may supervene. In plants which bear seed, it is plain that reproduction through generation is no longer depended upon to any great extent, the gems or buds assuming the office of points of axial extension, merely as a provision for a large compound plant. A tree with many thousand buds is really many thousand individuals of that particular variety, all joined together as they originated, and all contributing in their work of life to the common end—that is, the production of seed. But if one bud be properly detached, it may supply itself with roots of its own, and live and develop independently; or it may be ingrafted and unite its fortunes with compatible parts of another individual: but, do what we may in growing from cuttings, stolons, buds, cions, etc., we shall see that the apparently all absorbing object of life with the plant is to produce seed, and thus to provide in the natural way for a continuation of existence. Now, suppose we continue to thwart this master endeavor of the plant to reproduce by seeding—suppose we do as the planters have done with the sugar-cane, treat it in an unnatural manner in several different ways, but especially propagate it only by continuation, practically degrade it in the organic scale, so that it shall be only a gem or bud producing plant—it will in time, like the sugar-cane, even bud vary, so that it can not longer produce seed. Suppose we graft and regraft, and continue to propagate by extension, because we want a certain variety, we are all this time applying a disturbing force which, if we once give it a chance to exhibit its fruits by the production of variations in seedlings, will astonish us. All these things which men do to the plant to improve it, or better it for their use, are direct attacks upon the long-established habit of the wildling, and, if continued, must result in breaking up that

habit and rendering the plant variable, as the apple, the corn, or the cabbage. So far do the destruction of habit and the promotion of variability go, that even the bud, single in its parentage and usually constant to its nature, finally breaks away from all precedent and becomes radically changed.

If artificial measures and dealings with plants favor variability, we should then expect to find those plants most variable which exist under circumstances most artificial. Is this the case? All experience in floriculture and pomology answers, it is. The pelargonium, the petunia, the gladiolus, and the thousands of floral treasures which are and long have been propagated by extension, vary almost infinitely whenever seedlings are raised. The apple, pear, cherry, plum, etc., budded, grafted, for many, many generations, are almost equally apt to vary from parental forms, even though secured from a possibility of crossing. Our garden vegetables which, though regularly reared from seed, are yet, by constant high culture, stimulated away from their old habits, and generally very variable.

Only some of the cereal grains, and here and there some other individual plant which has a stronger hold upon habit than common, seem to resist the tendency of culture—propagation by extension and crossing, to produce a wide range of variability. But even they do vary, and vary enough to fill our proposition. There seems to be an essential and characteristic difference between the nature of a "sport" variation and a cross variation. That is a sport which is the appearance of hitherto unknown forms or features in a seedling or in a bud and its resulting branch; is apt to show a vigor and certainty of reproduction, a prepotency not known even in the parent or parents; it is apt to be—indeed, I think is always—self or single-colored, if the color was one of the changed traits which go to make up the sport; it is apt to be a reversion as well as a sport, changing back to remote parental forms at the same time that it changes to entirely new forms. The cross variation, on the contrary, is lacking in prepotency, variable in its offspring; it is parti-colored often. If it shows traits of reversion, it seldom, if ever, shows new traits at the same time.

The very fact that sports and cross variations originate differently suggests the cause of their difference in character, the disturbing cause in each respective case working in some special direction.

The sport arose in answer to one kind of a call made upon the parents; the cross also arose in answer to a call made upon the parents, but a different kind of call made in a different manner.

When, from any cause, or under any circumstances, a variation has occurred, be that variation ever so slight, if it is an improvement, we may set to work to intensify and fix it by selection and breeding, and thus, in time, a new habit may be developed.

If we were to inquire critically as to what elements the civilization and enlightenment and scientific progress we so love to boast consist in, we must conclude that it is simply an increasing sovereignty over the forces of nature—an increasing knowledge of the hitherto hidden ways of

the cosmos—and an increasing power to use elements of force or action which we could not wield aforetime. Every opportunity to gain a new control of natural forces should be ardently embraced—every chance to extend our domain should be seized with avidity; and here, in the matter of variations, which imply the possibility of improvement, is a broad and fertile field to cultivate. We cannot know too well why and how these things are. We cannot divest our minds too much of all prejudice and prior conceptions, when we approach a new matter to weigh and investigate it. And we can hardly, even possessing, as some of us do, the enthusiasm of the amateur florist or pomologist, estimate what values, scientific and material, may be made to flow from a right study of the branch of vegetable physiology relating to variations. It is my hope that, amid your studies of the other and great principles involved in horticulture, you will not neglect the branch I have so discursively and imperfectly treated in this paper; and, should my hasty thoughts provoke such attention to the matter as that it shall become in time and through study a clearer and clearer one in your minds, my aspirations will be fulfilled.

Prof. McAfee—It might seem a figure of speech when I speak of nuts holding a pine tree. In our white pine seed you may be troubled to imagine it, but here [showing] we have a nut of some one of the Rocky Mountain pines. You will see at the top a little plumule—that is, a whorl of pine leaves; in the center you can see a bud and stalk—and in the base it is a root in nature and appearance; we have actually a pine tree, in all respects perfect as a pine tree, only small—and a store of nutriment laid up with it.

RESOLUTIONS.

Mr. Greene—Before the regular order is proceeded with, I have a series of resolutions to offer, as follows:

Resolved, That it is the sense of this Society that our legislative bodies should recognize the importance of the rapidly extending horticultural interests of the State—which are now so apparent as to require no argumentative discussion—by providing for the reorganization of the State Horticultural Society, upon the basis proposed in the bill now before them.

Resolved, That the members of this Society, both present here and absent, are requested and expected to present the subject of this bill to the legislative members of their respective districts, in full confidence that a knowledge of its provisions and its importance to the State will prompt their favorable action.

Mr. Greene—In presenting these resolutions I wish to say that I do it for the purpose of getting the subject not only discussed here, but to get it before the people of the State, so as to create public opinion and sentiment in regard to it. Every one of you has probably some influence with your local papers. If you will get these resolutions published, as you well can, and get editorial reference to them, you will have reproduced

the opinions and sentiments of this body hundreds and thousands of times, and it is very much to the advantage of your Society to do it.

The resolutions were then put to vote and adopted without a dissentient.

REPORT OF VICE-PRESIDENT FOR THE THIRD DISTRICT.

Dr. A. G. Humphrey, the Vice-President for the Third District, then presented the following report:

Mr. President and Brethren:

The year 1873 is as memorable for the terrible destruction of orchards and nurseries, in the West, as was the year 1871 for the great fire of Chicago, where a great part of that beautiful city was laid in ashes. To the astonishment and wonder of the world we have seen, in the last two years, that city *rebuilt* more grand and beautiful than before. I am confident that the horticulturists of the West are men of like material, and possessed of as much enterprise and unyielding perseverance as were the business men of Chicago; so in the next two or three years at most we shall see our orchards and nurseries teeming with a larger supply, and a hardier and better quality of stock, than we have ever had before; so that we shall but be thankful for the wisdom and accumulated experience growing out of the calamities of the year.

I submit the following from several counties of my district, as exceedingly valuable for our future reference:

FULTON COUNTY.

"The past unprecedented cold winter, freezing up as it did, very dry, has killed outright very many orchard trees of tender varieties, and so injured others that the orchards of this county will never recover.

"*Pear* trees in some localities are nearly all dead. I had about two hundred trees (dwarf and standard) which had just commenced to fruit finely, and seemed perfectly hardy. I discovered very little blight a year ago this fall; but the winter so nearly finished them that I have not ten sound trees left.

"*Quinces* that have borne for years were entirely killed.

"Many tender *Grapes* perished; Concords came through better than was expected, yet have borne but little fruit. They are, however, making a good growth for next year's fruiting.

"Small fruit has done moderately well—*Raspberries* better than usual.

"We observe that the sheltered orchards have killed less and fruited much better than those unprotected. We must now plant new orchards, and surround them with belts of timber. White Pine, Norway and Austrian Pines are all good, but if too expensive, White Maple will do very well. By the time the orchard begins to bear it will be well sheltered.

"Our advice to the good people of Fulton county is to plant anew. Get only sound, hardy trees of a reliable nureryman, and immediately commence the work.

"N. OVERMAN.

"Canton, Ill., Nov. 15, 1873."

PEORIA COUNTY.

"The horticultural interest of this section is any thing but flourishing. The past winter and spring has been very damaging to fruit trees and to the fruit crop. My Pear

trees are ruined; but I have a few seedling Apple trees that came through all right. Rambo and Yellow Bellflower are badly killed. Our fruit crop is very light and of poor quality. Nearly all the trees and plants set last spring perished; in fact, I think they had but little vitality when taken from the nursery. I think nurserymen should be particularly careful to have their trees and plants properly taken from the ground, handled carefully, and delivered in good condition, and so have the good wishes of their patrons as well as their money.

"*Grapes* are not largely cultivated in this part of the county. I find it a good plan to give my vines a good shower of soap-suds every wash day.

"To keep *Apples* successfully, I gather carefully, and spread them in a cool out-room for some weeks, until cold weather forces me to put them in the cellar; in this way I have often kept fall apples until near spring.

"I am confident that it will pay well to protect our orchards with belts of timber or hedge. I have my orchard shielded in the south with Soft Maple, and on the west and north with Osage. Low-headed trees succeed best with us on the prairie.

"C. C. PERKINS.

"PRINCEVILLE, PEORIA CO., ILL., Nov. 6, 1873."

M'DONOUGH COUNTY.

"The fruit crop of McDonough county this year is small and not of the best quality.

"*Peaches* failed entirely, the older bearing trees being mostly frozen to death.

"Of *Apples* there is probably less than half an average, and the few that have been brought to market are, as a rule, knotty, unsound and very small. In many localities there has not been enough for home supply, but those who have a small surplus realize good prices—ranging from $1 to $1.50 per bushel.

"Almost no *Pears* have been sold in this vicinity--probably very few have been perfected.

"The same may be said of *Cherries*, for even the hardy and prolific Early Richmonds and Morellos made a failure in filling out.

"As for *Grapes*, the trusty Concord has well maintained its high character for hardiness and persistent bearing, and the quality and size of the fruit this year seems fully equal to that of former years. In consequence of the absence of other varieties, they have retailed very readily at ten cents per pound.

"Small fruits have done moderately well, but for these—such as *Gooseberries*, *Currants*, *Blackberries* and *Raspberries*—the home demand has been at least equal to the supply.

"The damaging effects of the past unusually severe winter upon fruit trees—especially Peach and Apple—while very discouraging to horticulturists, has stimulated inquiry as to best methods of winter protection. It has been generally conceded that in ordinary winters the less hardy varieties of trees, berry bushes and vines, derive unmistakable benefit from sheltering groves of timber, hedges, etc.; but with such a temperature as we experienced the last winter—the mercury ranging from zero to 36° below—it was not very surprising that they should succumb to the frost-king. The observable fact that *young* Peach trees have come out unharmed by the long-continued freezings, may lead to some doubt as to the greater *hardiness of well-ripened wood*, and should at least prompt all lovers of this delicious fruit to *plant every year*, to insure a continuous supply.

"Those orchards that are *closest planted*, with *low heads*, *most sparingly pruned*, and most sheltered by adjacent trees (*ceteris paribus*) seem to best withstand the rigors of winter, and the parching droughts of summer.

"Yours, etc.,

"ANDREW HAGEMAN."

STARK COUNTY.

"But little information can be given of the progress made in or the development of horticultural matters in Stark county the past season. Energetic effort, as usual of late years, was put forth in the spring to accomplish something in a practical way, but it has proved, to a considerable extent, labor in vain—work without a proportionate reward—the effects, it is supposed, of the cold winter of 1872-3. It would probably be

the truth to assert that, instead of progressing in horticulture, particularly in reference to orchard fruits, in this county, we remain about in *statu quo*. The cold of last winter was undoubtedly the most severe ever experienced in this locality by the oldest settler—the mercury at one time 34° below zero, and we had several cold snaps when it indicated 20° below. Many of the bearing trees were therefore very much injured, some killed outright, and much of the new purchase of nursery stock—probably fifty per cent. of it, or more—proved to be good for nothing. It is the opinion of our best orchardists that the per cent. of injury done to the bearing Apple trees by the cold of that memorable winter cannot be known until another season, and that it would be merely speculative and unsatisfactory to attempt to give the facts at the present time.

"It is an ill wind that blows nobody any good, however. The cold which has done so much injury may compensate in a degree by adding to our stock of knowledge as to the hardy kinds of fruits—a question which is very important to settle, both to the orchardist and to the nurseryman. Therefore, the privilege of comparing the notes of the different contributors, and reading the discussions of the learned and observing, which will appear in the "Transactions," will render the forthcoming volume of the Society invaluable for the information it may contain upon this subject alone—*the injury done to trees, shrubs and vines the past winter.*

"All fruit trees are supposed to be more or less injured. An imperfect list is appended of the Apple, the crop of which for 1873 is not one-fourth of that of the season of 1872, when this county exported thousands of bushels:

"*Winter.*—Rawles' Janet, Winesap, Domine, Willow Twig, Golden Russet, Limber Twig, Tolman Sweet, Northern Spy, Red Romanite, Newtown Pippin, Seek-no-further Bellflower, Rambo, Jonathan, are mentioned as apparently the least injured. Pa. Red Streak, Michael Henry Pippin, Milam, Ben Davis, Winter Pearmain, Sweet Vandevere, as tender and most injured.

"*Fall.*—Snow (or *Fameuse*) Maiden's Blush, Sops of Wine, Fall Wine—hardy. Fall Winesap, Autumn Swaar—tender.

"*Summer.*—Red June, Early Harvest—hardy.

"*Peaches.*—An entire failure of trees and fruit.

"*Pears.*—Very much injured; crop a failure.

"*Cherries.*—Apparently hardy; about one-fourth of a crop, though the Early Richmond did the best.

"*Grapes.*—Hardy, and generally a good crop.

"*Gooseberries.*—Houghton's Seedling, hardy, and an abundant crop of the fruit.

"*Currants.*—White, black and red, hardy; about one-eighth of a crop.

"*Raspberries.*—Black cap, hardy, and a good crop.

"*Strawberries.*—Wilson's Albany, hardy; crop abundant.

"There is nothing in our mode of cultivation, as a general rule, as orchardists or fruit-growers, that can commend it to others to practice. We are good patrons of the nurseryman in the way of purchasing his commodities, and the annual purchases are largely upon the increase; but when the article—whether a tree, vine, shrub or flower—is once set out, it is left too often to struggle for itself, for the want of time, and for having 'too many other irons in the fire' to attend to it. Good cultivation, judicious and timely pruning, an irrepressible warfare against the increasing insect tribes, draining in many instances, and protection, are all essential to the success of the horticulturist; and when these matters are properly attended to, the result will be a better quality of fruit and larger pecuniary returns for the investment.

"We have no nurseries in our county, consequently the stock is all purchased from abroad; and the experience of another season is added to former ones, that it is better to patronize home institutions—and those as near home as they can be found—in making selections. It is to the interest of our home nurseries to *keep* and to *know* what is wanted in the line of the useful or ornamental, and so evidently is it the mutual interest of the farmer or fruit-grower to patronize them, it is surprising that those itinerant speculators, with bottled specimens and fabulous prices, hailing from other states, should be so successful in fleecing the natives as they were the past season.

"W. H. BUTLER."

HANCOCK COUNTY.

"Heretofore the fruit grower has had but few back-sets, except from insect depredations. The uniform average yields had become a matter of course, and disappointment in the crops of fruits (except Peaches) was unknown. The year 1869 was memorable for the excessive rain-fall; that of 1870 for an excessive yield of fruit, and 1872 for large crops, accompanied by extremes of drought, with these opposite extremes, followed by the unusual severity of last winter's cold. Orchards and fruit trees generally were subjected to greater extremes than has ever been before experienced.

"The results have been damaging, more or less, to all orchards, and to all kinds of fruit trees. The number of Apple trees which died might be five per cent., but of those of weakened vitality, at least twenty-five per cent.

"Another year will develop the character of the injury, and may require the substitution of new trees entirely.

"The season of 1872 was such as to promote abundance of fruit buds in orchards; consequently the bloom was quite abundant, and the amount of fruit set promised an ordinary yield; but from unseasonable spring frost and cold, with the weakened vitality of the trees, half or more of the fruit fell off. Another disaster, unexpected, occurred on the evening of the fourth of July, in a violent storm, continuing unabated for more than an hour. Hundreds of Apple trees were uprooted, the fruit mostly beaten off, with much irreparable injury to the trees. As an evidence of the violence of the storm, in many tracts of forest timber, one-third were broken off or uprooted. Many large elms, which had withstood the elements for hundreds of years, were leveled to the ground, or broken off. In some instances, Apple trees were uprooted and blown out of the orchard into other inclosures.

"A. C. Hammond, President of our County Society, lost, or had injured by this storm, over two hundred Apple trees.

"With such an array of disasters—such a record of extremes of heat and cold and excessive crops—how could vegetable life maintain its equilibrium? Discouragement to the fruit-grower has been inevitable; yet, in the face of multiplied difficulties, there is an effort to study more carefully the adaptation of varieties, and to husband the experience already acquired. It is needless to add that the Apple crop was next to an entire failure."

"*Shrubbery* and *vines* have shared in the general injury from causes indicated; yet the Concord and Clinton Grapes have been exceptions, as standing the test of winter and bearing moderately fair crops.

"The Catawba failed, I think, with one exception—that of Mr. John Kemmer's vines, who covered them over winter, and was rewarded with as fine Catawba Grapes as were ever grown in the county.

"The influences of timber belts, so far as ascertained, all prove beneficial, in less injury to trees, with better yields of fruit.

"Orchards here are generally cultivated till well into bearing, then seeded to clover or blue grass.

"*Varieties of Apples.*—The Ben Davis takes the lead as a market apple. That and Winesap, Willow Twig, Rawles' Janet and a few leading varieties, are generally selected for new orchards for market fruits. For early use, Early Harvest, Red June, and Red Astrachan are mostly prized.

"The best modes of keeping Apples have received the attention of our Society. Barreling is generally concurred in as the best; next to that, boxes and bins. But either of these modes require an even, low temperature.

"*Care in handling apples* is among the first requisites to their keeping, as one defective apple will impart the contagion to a dozen around it. When once stored, they should on no account be disturbed till wanted for use or market.

"*Peach* trees which were shortened in have made a satisfactory growth. In a few instances here, trees were cut to the ground, and these failed to send up new growth.

"A few scattering blossoms made their appearance on the most elevated places, but two peaches were all that matured in this section, one of which was exhibited at our October meeting.

"During the years of ordinary crops of fruits, the orchard products of Hancock county are estimated at 100,000 bushels.

"B. WHITAKER."

MERCER COUNTY.

"On the effects of our past winter we are probably liable to form very erroneous judgment. Probably the seeming damage from winter has been much aggravated by the drought of summer; but the effects of winter appear to have been in many respects contrary to all past experience.

"As is well known, it is not an uncommon thing in our climate for the tender portion of the young wood of Apple trees to show manifest signs of injury from winter by a visible discoloration between the bark and wood; but no evidence of such injury was to be seen the past spring. And while this is true, yet for some cause the young shoots of many of our Apple trees did not start well in the spring. We may err in our conclusions regarding the cause, but it seems that the shoots were not supplied with sap. What may seem most unaccountable is that Pear trees were badly discolored between the bark and wood; and yet the buds of Pear trees started, while the shoots of many Apple trees that were not in the least discolored fail to start. It is true that many of Pear trees that first started in spring have since died, or partially died, while many Apple trees, that failed to start in their terminal shoots, have suckered out below with considerable vigor. This is especially the case in young orchards and in nursery trees.

"Another strange circumstance is, this seeming injury or want of sap in the shoots prevailed in very many cases, in varieties most characterized for being hardy; while some varieties, that have heretofore proved quite tender, started well. Another circumstance seems also strange, that while we have generally thought it best to guard against the severity of winter, by laying down and covering Concord Grape vines, that the vines left tied up to stakes received no visible injury, and have produced heavy crops.

"It is certain that many varieties of Apple trees have suffered more severely than the Concord Grape. The Martha Grape seems to have proved nearly or quite as hardy as the Concord, while very few Delaware vines survived. It is proper to state, however, that on the sandy lands bordering the Mississippi, Concord Grape vines surfered badly—even worse than Apple trees.

"The damage to young orchards seems confined to a very limited portion of trees, and is visible in some portion of the tops being dead. I have not been able to gather any facts that seem to point to any conclusions regarding the influence of groves of timber. Orchards on naked grounds seem to have suffered more severely than where a heavy crop of corn stalks was on the ground.

"*The drought* of the past season has been the worst ever known since the settlement of the country. We had one heavy cold rain in May, when orchards were in full bloom, which seemed to prevent the fertilization of the blossoms; and to this we attribute the failure of the Apple crop. It appears that no blooms produced fruit except the late ones that were not out at the time of the rain storm. Since that one rain storm in May, it is said by those who have made observations that we have had the least amount of rain during the summer and autumn months (up to the writing of this report, November 10th) since the first settlement of the country. There is a great loss in trees transplanted the past spring, and the result is disastrous on much young nursery stock. Our Grape crop has been a perfect success, and it appears the lack of rain that has been disastrous to other horticultural operations has been most favorable for the perfection of the Grape crop.

"It is proper, in closing, to acknowledge my indebtednees to McWhorter & Hays, of Aledo Nursery, for some of the facts embodied in this paper.

"MARION VERNON.

"NEW BOSTON."

The following is an extract from a letter sent me from J. V. N. STANDISH, Professor of Mathematics and Astronomy in Lombard University, Galesburg, Ill. :

"I desire to call your attention, and through you that of the members of the State Horticultural Society, to one of Rogers' Grapes which I have fruited the past three years. The vine is about seven years old, from a cutting. * * * I suppose it to be Rogers' No. 5, or No. 3. I have not much doubt of its being the former. The vine is vigorous, not subject to leaf blight, and a great bearer. It is as hardy and as early as the Delaware, and, according to my taste, *preferable*. The bunch is large and compact, berry large and round, or nearly so. The color, when ripe, is like the Diana. For this section, it is one of the best, if not *the* best, of all the hybrids. During our fair, more than thirty persons, amateurs and others, tested it with the Black Hamburg without knowing which was which, and all but three pronounced "No. 5" the *superior grape*.

"I said that this Grape is as hardy as the Delaware. So it is. But in this section, during our cold winters, it requires protection. So do the Delaware and other varieties. I am convinced, from experience, that all Grapes will do better when protected, even the Concord. Last spring, Concord vines protected were ten days earlier than Concords within twenty feet of them unprotected, and every bud was vigorous. Hence I say to all grape-growers in this latitude, *protect your vines*."

WOODFORD COUNTY.

"I will try and give a few *brief items* in regard to the horticultural interests of Woodford county.

"In the more western portion there are many valuable old orchards, and occasionally an old orchard in the eastern part. Many young orchards have been planted within the past four or five years, but there are still many farms without a fruit tree growing thereon. The winter of 1872–73 was very severe, and damaged both orchard and nursery trees to considerable extent, especially four year old Apple trees in nursery rows that were root-pruned in the fall with a tree-digger. I have not noticed any old orchard trees that were killed outright; but many young orchard trees are killed or damaged to such an extent that they will have to be replaced.

"The Early Harvest, Snow, Duchess of Oldenberg, Bailey Sweet, St. Lawrence, Willow Twig, Ben Davis, Grimes' Golden, Yellow Bellflower, Haas, Red Astrachan, and the various crabs, suffered the least. Apples, Pears and Plums were almost a failure in fruit, there not being one bushel of apples the past fall where there were twenty in the fall of 1872.

"*Cherries*, only a light crop.

"*Blackberries* a failure—Kittatinny being killed to the ground.

"Doolittle and Turner *Raspberries* produced a fair crop, while the Purple Cane and the Miami were so damaged that we cut them all off at the ground. The Miami proved hardy on various town lots, where not so highly cultivated or manured. The Davison Thornless proves entirely worthless with us.

"*Strawberries* were a light crop.

"*Grapes*, (Concord) a fair, and, in some cases, a good crop. This is the only variety, out of many tried, that we can recommend on our rich, level prairies.

"*Tree Planting* has not received that attention it deserves in our section, (being several miles from any body of timber,) though I am happy to say that the farmers are beginning to talk about planting groves, and it is to be hoped that they will not only "talk," but soon *act* in the matter.

"Box Alder is rapidly gaining in public favor, that tree not being liable to the attacks of the borer, as is the Soft Maple, which is beginning to lose favor on that account.

"The Sweet Chestnut does not seem to be at home on our level prairie.

"I had some two thousand trees in nursery rows, (two to three feet high,) and lost about half of them the past season. I might have saved a portion of them, perhaps, by timely cutting off at the collar.

"Hoping the day will soon arrive when tree planting will receive more attention than it now does, I remain,

"Yours, respectfully,

"C. F. LEE."

MARSHALL COUNTY.

"Practical horticulture has been so disheartening the past season, that I could hardly make up my mind to send in a report from this county. Not only were fruit trees greatly reduced in vitality by the severity of the past winter, and previous causes, but a drought of great severity set in at the most critical time of the summer, causing us to lose many trees that would have survived and done well if we could have had a good growing season. The drought killed nearly all the trees that were transplanted last spring; none survived but those that had the very best of care. I have given careful attention to the effects of the winter on our orchards, and find that about one-third of orchard trees, old and young, on the rich soils of the prairies, are dead; another third so badly injured as to be worthless; the remaining third will regain their thrift, though all are materially injured.

"All trees and plants that were subject to the exremes of the past winter—no odds of what species, or how hardy—were greatly reduced in vitality; and no trees, whether transplanted or not—and no odds how favorable their situations were—made an average growth the past summer; nothing but plants grown from seeds the past spring made an average growth, and but very few of these. Yet the season has not been without its lessons, though very discouraging.

"As to the hardiness of different varieties and species, I have but little that is new to offer. Some kinds that we had thought fully hardy prove not to be so; notably among these are the Ben Davis and Red Astrachan Apple trees, which, though among the hardiest, do not equal in nursery or orchard some varieties that had not been classed as 'iron clad.' The Milam, Wagoner and Sops of Wine prove hardier, and the tree least injured in my grounds in nursery is Sops of Wine, though Wagoner, Milam, Fourth of July, Fameuse and Late Strawberry about equal it.

"The Apple tree least injured in orchard, old or young, as it was after the terrible winter of 1855–56, is Roman Stem; the next best, judging from its crop of fruit and thrift of tree, is *Maiden's Blush!* the next, Willow Twig, then Ben Davis, Stark, Rambo, etc. I find that many varieties that are quite tender in nursery are among the hardiest in orchard. Thus, Stark proved the most injured in nursery of any variety on my list, yet fruiting trees are but very little injured; the same proves true of Maiden's Blush, Rambo, Grimes' Golden, etc. The Apple crop in this neighborhood might be called a complete failure; Pear crop ditto. Two-thirds of the leading varieties of Pear trees appear to be ruined. Of small fruits of all kinds we had a full half crop, and some plantations that had extra or proper care gave bountiful crops.

"Among new fruits, I would favorably mention the Japan Pear, which proves hardy and very productive; it will probably take the place of the Quince in the northwest as a cooking fruit.

"The *Wild Goose Plum* proves hardier and more productive than the Miner, and I think nearer Curculio proof. It is of very much firmer quality and appearance, ripening with me from the 15th to the 25th of July. I have a Plum of the same family, that I received from my friend the lamented Downer, known as the Wayland, that surpasses the Wild Goose in quality to a marked degree—it is a month later. I have no doubt but that in the Chickasaw (*P. Chicasa*) family of native Plums, we will find eventually one of the most valuable fruits for the Northwest.

"In the family of *Apples* known as Siberian Crabs, I am well convinced, from observation and from fruiting several seedlings the past season, we will yet find varieties of great value; we have those of very great value at present, but each season gives us advance. We have them now almost equaling the best pears to eat, and others equaling he peach for cooking.

"Some new varieties of *Apples* from Minnesota, Northern Iowa and Wisconsin appear to be fully as hardy as the Siberian Crabs, but still they do not, nor cannot, fill the place of the Crabs any more than the Crabs can that of our best Apples.

"The common European *Plum* (*P. Domestica*) should be entirely discarded from our lists, as it is manifestly not for us; let the Northwest drop it. I think a man who would sell or plant a tree of it within the bounds of this Society should be prosecuted.

"D. B. WIER."

REPORT OF VICE-PRESIDENT FOR THE FOURTH DISTRICT.

Mr. L. C. Francis, Vice-President for the Fourth District, then presented and read his report, as follows:

Mr. President, and Members of the State Horticultural Society:

The Vice-President for the Fourth District would report that the past winter has been the coldest winter known in Central Illinois; the thermometer ranging from thirty to thirty-six below zero, and in the wide spread desolating effects upon the orchard, vineyard, and fruit garden, forcibly reminds one of the scriptural interrogatory, "Who can stand before His cold?"

I have received reports from A. W. Estabrook, Christian county; Phil. M. Springer, Sangamon county; E. Daggy, Douglas county; W. H. Mann, Iroquois county; J. B. Reeve, Shelby county; M. Y. Colman, McLean county; H. J. Dunlap, Champaign county; Chas. Capps, Logan county, and Tyra Montgomery, Coles county.

A. W. Estabrook, of Christian county, reports:

"The effect of the past winter on almost every variety of fruiting, vine, tree, and shrub, was disastrous.

"*Grapes*, on low ground, were many of them entirely killed; those on high, rolling ground suffered less. The Concord, Hartford, Prolific and Iona were little damaged; the Isabella to some extent, and the Delaware, in every instance, as far as I know, was killed to the ground.

"*Apple* trees were not seriously hurt, but the crop of fruit is hardly sufficient for home consumption.

"*Old Peach* orchards suffered immensely; but young orchards passed through with little or no apparent injury.

"*Raspberries* suffered badly; Miamis, entirely killed; Doolittles suffered less and bore some fruit.

"*Strawberries* were extensively killed, even where well mulched.

"The leading varieties of *Apples* cultivated in this vicinity are Bellflowers, Domine, Red June, Early Harvest, Red Astrachan, Maiden's Blush, Winesap, Ben Davis, Rawles' Janet, Limber Twig, and Willow Twig."

Phil. M. Springer, of Sangamon county, writes discouragingly about the *Grape* crop; last year the market was overstocked, so that grape-growers were glad to sell Concords at three cents per pound; this year no crop to sell—vines of nearly all varieties being killed to the ground.

Mr. E. Daggy, of Douglas, reports:

"I cannot particularize, as I would desire to do, at this late date, but give you a few facts that came under my own observation, and are the result of sad experience on our own grounds—knowing that though on a small scale the facts are no less facts than

if on ever so large a scale. I will give you the results in a specimen orchard of about a hundred sorts of Apples, nine and ten years planted—naming enough varieties to indicate the effects on similar sorts also.

"*First*, The effects of the past winter upon trees, shrubs, and vines:

"In looking at the effect of last winter's cold upon Apple trees, it seems to me we must go back to the October freeze of 1869, in order to get at the actual facts. The summer of 1870 was an extremely dry one, and many trees did not survive it, while others lived through it—yet 'so as by fire'—and have been feeble ever since. Many of them recovered sufficiently to bear a very heavy crop last year, as a dying struggle to maintain their vitality; but last winter proved too much for them, and so ended their feeble struggle for life.

"This experience gives me a kind of tottering basis upon which to fix an opinion as to which are hardy and which are tender sorts; but it has established nothing with certainty, except that nearly all fruit trees are liable to more or less damage during our sudden and severe climatic changes.

"In our orchard of about a hundred sorts, not more than five or six have stood the test. This list stands as follows: Little or no damage, Duchess of Oldenberg, Hoops, Snow, Tolman Sweet, Eng. Golden Russet, Willow, Harrison Cider, and Limber Twig.

"The following varieties have some trees injured: Carolina June, Red Astrachan, Winesap, Rawles' Janet, Jonathan, Mosier Sweet, Northern Spy, Gilpin, Seek-no-further.

"The following sorts were all more or less injured: Rome Beauty, Golden Sweet, Fulton, Farley's Red, Maiden's Blush, Summer Pearmain, Yellow Hoss, Sweet June, Minkler, Vandevere Pippin, Keswick Codlin, Newtown Spitzenburg, Pond Sweet, (?) Porter, Striped Gilliflower.

"The following sorts were nearly all killed: Early Harvest, Rambo, Summer Queen, Fall Wine, Milam, Sweet Bough, Ben Davis, Yellow Bellflower, Primate, White W. Pearmain, Newtown Pippin, Ladies' Sweeting, Belmot, Winter May, Ramsdell's Sweet, Royal Pippin, Fallawater, Fall Pippin and Ortley.

"On the *clay* or *hazel soils* of our county, the damage was not so great, yet I have no account of any orchard that escaped injury to some extent; and I think the above is a fair indication of the injury done in most of them.

"*Pear* trees suffered even more than the most tender Apple trees of the fourth class mentioned above.

"*Cherry* trees shared a similar fate; those on Mahaleb and Morello stocks are in the same condition, and even the old Morello, which has never suffered the wound of bud or graft, was badly injured.

"A younger grade of cherry on Mahaleb, procured from the North and planted in the orchard three and four years since, escaped with less damage, and many of them will perhaps recover a tolerable degree of health. But there was no fruit this year even on them.

"Many of the trees referred to above budded out, and indeed were covered with bloom; but, like the tender plants of the stony ground, as soon as 'the sun was up, they withered away.'

"The fruit crop was very meager indeed; only a few orchards produced even gnarley and wormy fruit, and this, I think, was confined mainly or wholly to the mulatto soil.

"*Grape* vines suffered very much from the winter killing of the buds; so the crop of fruit was poor everywhere, and in many cases none at all.

"*Effects of Protection.*—On the second topic suggested, I have only to say that I think it probable that the effect of the soil was greater than that of timber belts; but as there are no artificial belts of sufficient age to make a test in this vicinity, the natural belts or timber lines and mulatto or hazel soil always effect the same orchards, and these are our oldest orchards, and those that produced the best crops this year.

"*Cultivation.*—On the third topic, there has been so much said and written for our reports, that I fear to attempt to offer any thing new. And here again allow me to say that I think there is more in the quality of soil than we can effect by cultivation, and on our black loam I think stimulants entirely unnecessary, and as little cultivation should be

given to orchards after the second year as possible, at least until the orchard has borne several full crops. After this there may be some want of stimulants and culture; but the application must be made cautiously, so as not to induce a second or fall growth, which is liable to be caught as it was in the autumn of '69, with such disastrous consequences.

"On the fourth, there is room to say a great deal, as it covers extensive ground, on a variety of subjects.

"In regard to planting, I have found that it is useless to plant varieties of trees not adapted to our soil.

"Ten years' experience has satisfied me that we should plant with more regard to the hardiness of trees than any other single point. This point having been gained, we may seek for quality in other respects—such as quality of fruit, appearance and keeping, bearing quality of trees, etc.

"The past season has been an exceedingly discouraging one to the fruit-grower and orchardist in this locality. The year '72 flattered us so that we were poorly prepared for the reverse which followed so soon.

"The trees which survived show indications of an intention to give us a full crop next year; but it is safe to say that not over one-half the Apple trees in our county are in condition to give us even another crop of fruit; and of Cherry and Pear trees, there are only a few that will survive in good condition.

"Peach trees are all injured, and indeed mostly killed.

"Small fruits were scarce, and poor in quality.

"E. DAGGY."

W. H. Mann, of Iroquois, reports the following:

"The *Apple* and *Pear* crops were almost an entire failure.

"*Cherries* and *Grapes* a moderate crop.

"*Strawberries* good, and paid from three to five hundred dollars per acre profit.

"Many *Apple* orchards were very much damaged by the winter. We must confine ourselves to fewer varieties, selecting the most hardy, though the fruit may not be of the best quality. Every thing has entered winter quarters this fall in good condition, so that the prospect for fruit appears good for next season, where the trees are not too much injured by the past winter.

"Kittatinny *Blackberries* were an entire failure.

"*Raspberries* were one-fourth of a crop.

"Some three years since, friend Douglas, of Waukegan, sent me a Blackberry bush, unnamed, to test; it proved perfectly hardy and was well loaded the past season with small but sweet fruit."

J. B. Reeve reports a similar condition of things in Shelby county, and adds:

"Some Apple and Pear trees which were injured by the winter have been dying during the summer. The damage is worse on flat than on inclined lands. Where trees were protected by buildings or timber there was more fruit and less injury to the trees."

M. Y. Coleman reports that in McLean county nearly all the Apple trees are so much damaged that the hearts are black and seem to be dried up—the English Russet trees, four years old, being the only ones free from this appearance; that young trees, in nursery, have made but little growth this year; and that heading them down did not induce them to throw up strong shoots; that many bearing Apple trees have died, while others have barely lived through the season. He noticed no advantage of a proximity to timber belts. The Grape vines in the county where protected (covered) produced about the same as last year.

H. J. Dunlap, of Champaign, sends the following:

"The past two seasons have been of very marked character in their relation to the horticulturist and fruit-grower, more especially in their effect upon trees and vines.

"The summer of 1871 was excessively dry and hot, and the soil, at freezing up, was devoid of moisture for several feet below the surface. Many of our choicest evergreens were dead when spring came, from some mysterious cause, now supposed to have been the dryness of the soil about their roots. Fruit trees made but little growth, and perfected an enormous quantity of fruit buds, followed in 1872 by the largest crop of fruit ever known in this locality.

"The season of 1872 still continued very dry, not enough rain having fallen to moisten the soil a foot below the surface, since the beginning of the year previous.

"As a result all varieties of trees made a feeble growth, to which add the depletion of vitality caused by a superabundant crop of fruit. We have our trees ready for winter in a very weak condition, and the soil dry to the blue clay underneath.

"As is well known, the winter of 1872–73 was one of the coldest ever known in Central Illinois—the mercury denoting 36° below zero at one time, and a range of 20° to 30° below being common for several days in succession.

"The result could not but be disastrous. Many of our supposed hardy varieties of trees and vines were killed outright, others partially, while the more tender varieties went where the 'woodbine twineth.'

"The summer of 1873 in this locality continued very dry until about July 1st, when we had a succession of showers, which succeeded in spoiling a portion of the hay and harvest, rendered the working of corn impossible for weeks, and did no possible good so far as I have been able to see.

"At this writing—November 14th—the ground is lightly covered with snow, and frozen a couple of inches deep, while the subsoil to the blue clay is as dry as it was one year ago, but the upper soil is moist to a depth of eighteen or twenty inches. Should the winter be a severe one, I fear that we shall lose a majority of all the trees in our orchards, as their weak and diseased condition makes them unable to stand severe cold.

"Among the varieties supposed to be hardy, but which were badly injured, are Keswick Codlin, Red June, Autumn Swaar, Ben Davis, Minkler, Smith's Cider and Wagoner.

"I have about one hundred trees of Minkler, ten years old—a majority of which will never leaf out again.

"Rambo, Baldwin, Esopus, Spitzenburg, Milam, and dozens of other varieties known to be tender, suffered badly.

"It is needless to say that there was but little fruit of any kind last season.

"*Cherries*, on all varieties of stocks, suffered badly—thousands of E. Richmonds in the nursery, on Morello stocks, being dead, root and branch, and those on their own roots suffered just as much.

"My own orchard of six hundred and fifty trees—all on Morello stocks—was badly injured, especially the east side, where many of the trees were killed outright, whilst the west side was but little injured, and produced some fruit.

"Nearly all the trees planted in the fall of '72 and spring of '73 died—supposed to have been caused by freezing, as whole rows of trees in the nursery never leafed out.

"*Pears* of all varieties were more or less injured, the Belle Lucrative and Flemish Beauty seeming to be the healthiest at present. Blight has attacked many trees, doubtless caused by the weakened state of the trees.

"*Plums* are but little grown—many trees dead or dying.

"*Quinces* killed to the ground.

"*Grapes* produced a light crop. Many vineyards of Concord, Ives, and Hartford were killed to the ground.

"Among the *Raspberries*, only one—Doolittle—produced much fruit. The Miami suffered badly, as did all other varieties.

"*Blackberries* were all killed.

"In these few remarks, I must only be considered as speaking generally, as in many isolated cases none of them will apply. I am well aware that many Cherry trees are hearty, and produced a good crop the past season; so also of Grape vines, but in all such cases, there are circumstances around the individuals not applicable to the general fruit-grower.

"We have heard but little of insects the past season, for the reason that there has been nothing for them to prey upon. If we are to enjoy immunity from them for a few years, time only can tell. It seems to me that the Curculio must be played out unless it breeds in some other fruits than Plums and Peaches."

C. S. Capps reports thus from Logan county:

"The extremes of drought and cold, which have occurred here during the past two or three years, have been very destructive to trees, shrubs and vines; the damage, though generally attributed to the extreme cold of the last winter, is no doubt partly owing to the inadequate supply of moisture, which left vegetation in bad condition to resist the extreme cold. The Pear blight, which has left scarcely a sound tree in the country, has also, doubtless, been in a great measure owing to the same causes. The fatality among Pear trees has so discouraged planters that the culture of the Pear is likely to be abandoned, unless some remedy for the disease is discovered. Pear trees used to be healthy here, and I think may become so again, if we can have seasons more regular in temperature and moisture. It is possible that, like epidemics among men, and epizootics among animals—this epi—what shall I call it?—among Pear trees may run its course and cease. Mr. Charles Downing writes me, in a letter of July 30, 1872, as follows: 'I saw a small branch of Pear tree blight a few days since, the first for nearly twenty years past, and yet nearly sixty years ago we had it worse than I ever saw it anywhere; in fact there was scarcely a tree left in the whole town; and in my father's place only one stump, three feet high. He kept cutting daily as the disease spread, until all was gone but this one stump, which afterwards made a fine tree.' The degree of cultivation or exposure seems to make no difference; trees seem to be equally subject to blight under all circumstances; nor do I notice any difference in this respect between dwarfs and standards. Yet I do not think we ought to give up Pear culture, but persevere and hope for 'the good time coming.'

"*Cherry* trees have fared almost as badly; even the common Morellos, grown from sprouts and suckers, have not escaped; but this, taking into consideration their bad habit of sprouting, is perhaps not much to be regretted.

"We have lost about all our *Quince* trees.

"Many bearing *Apple* trees have died, which will afford us a good opportunity for determining what varieties are most hardy.

"I know of no instance where timber belts have been of the least advantage to orchards in the way of protection from cold. I believe that the healthiest and most productive orchards are those situated on high prairie lands, without protection.

"Old *Peach* trees that had been weakened by large crops were generally killed or very badly damaged by the winter, while young Peach trees stood the winter well, and have made a fine growth.

"Our nursery trees which stand on high, dry prairie land, unprotected by timber belts, came through the winter in good condition: but the trees in another nursery, surrounded by timber except on the east, are very badly damaged. This is on a clay soil; ours on a light sandy loam. We have never, in all our experience, had so bad a season for transplanting trees and shrubs as the past season has proved to be.

"Our *Grape* vines were not protected last winter, and the following varieties were killed to the ground: Adirondac, Allen's Hybrid, Alvey, Catawba, Crevelling, Delaware, (weakened by leaf blight) Diana, Iona, Isabella, Israella, Ives, Maxatawny, Norton's Virginia and Rogers' Hybrids. The following sorts proved hardy: Concord, Hartford Prolific, Clinton and Perkins. We have one vine of Christine which did not die, but failed to bear this year. It bore last year, and we were much pleased with the fruit. The Concord seems, however, the only good *reliable* Grape we have.

"Fruit crops this year, in this section, are almost an entire failure; the Black Cap and Philadelphia *Raspberry* and Concord *Grape* being about the only exceptions.

"I will mention a few things that have not proven hardy here: The English Walnut and Spanish Chestnut have always been killed to the ground before getting large enough to bear. Laburnum and Paulonia Imperialis, ditto. Chinese Magnolia (*Obevata*), Rhododendron, English Yew, Tree Box, Mahonia, Cypressus Lawsoniana, Enonymus, Golden Arbor Vitæ and European Silver Fir, are not hardy or satisfactory here, but might do with protection from the sun in winter and from our March winds.

"Orchards should have clean culture until they begin to bear, then should be seeded down with Red Clover, and the clover crop left on as a mulch. A heavy mulch of straw, leaves or litter, is very beneficial to trees, shrubs and vines. A tough blue grass sod is very injurious.

"The Newtown Pippin *Apple* has proved to be one of the best and most productive Apples with us, and I think deserves more attention than it receives. The hardy varieties of the Magnolia are too much neglected by those who are ornamenting their grounds. The M. Accuminata, M. Tripetela and M. Glauca, succeed admirably here, and only need to be seen in leaf and flower to be appreciated. The Magnolia Glauca, though a native of swampy land, succeeds very well here if cultivated while young; it grows ten or fifteen feet high. The other varieties are beautiful, smooth, symmetrical trees, very appropriate for planting near buildings. The Virgilia Lutea, the Tulip tree, the Ginko tree, White Birch, Purple Leaved Beech, Larch andM ountain Ash, are also beautiful trees for shade and ornament, and ought to be more generally planted.

"Fearing that I may be taking up too much space, I will close."

COLES COUNTY.

Tyra Montgomery writes from Mattoon, in answer to inquiries sent him, as follows:

"DEAR SIR: In reply to your card, requesting the result of my observations in regard to certain topics, I respectfully submit the following as notes under the different headings:

"'The effects of the past winter upon trees, shrubs and vines' have been severe, and many orchards have been almost ruined, especially on clay soil in the timber lands.

"*Peach* trees nearly all killed.

"*Pear* trees injured, followed by blight.

"*Cherry* trees not hurt much. May Duke and Early May came out all right and gave a fair crop of fruit. Some, however, on Morello were killed, but old, well established trees did well.

"I remark in regard to *Apple* and *Peach* trees, that the two very dry seasons past, bad care—bringing weeds and borers—left the trees in the worst possible condition to endure such severe cold. Very little damage was done to trees in nursery rows, or orchards where proper care and labor had been bestowed on the trees.

"The Concord bore a fair crop and was not hurt; Hartford did not do well; Delaware still worse; Clinton, Catawba, Diana, etc., bore no fruit, and vines killed.

"Small fruits were more or less injured.

"*Blackberries*, no crop.

"*Black Raspberries*, light.

"*Currants* and *Gooseberries*, very light. The Kittatinny, which before proved hardy and gave such general satisfaction, yielded to the frost of last winter and can no longer reproach the old Lawton.

"Upon the whole, these effects should discourage no one. Plant good stock, take good care of your orchards, keep clean and clear of insects, and the cold winters need not cause any great alarm.

"As the subject of protection, or the 'influence of adjacent groves or belts of timber upon orchards and vineyards' will, when properly understood and practiced, be a great

safeguard against the damages from severe cold, I observed that where small fruits were near hedge fences they produced a much larger crop and better fruit, and everywhere near this place where there was protection, good results followed. Timber belts and hedges of evergreens should be planted on the north and west of orchards on the prairie, and the ground about the trees mulched deep and well, and especially on clay soil, the mulch to be put on after the ground freezes. If the subjects of soil, situation and protection of orchards and vineyards were more carefully studied, and better understood, better results would follow the planting of orchards and vineyards; especially is this subject brought to notice in trying certain varieties of Apples on soil not adapted to their growth and fruiting. The Bellflower and Northern Spy have been often denounced for refusing to 'come to time' on prairie soil, while on clay lands they do much better, and timber orchards cannot afford to be without them. At Pana, Ill., I noted an orchard situated so as to enclose the north and south slopes of a hill. At the time I saw it the trees on the north side were loaded with fruit, and those on the south side had scarcely any at all; so it is not always in favor of '*southern slopes*,' as we read in the books. As a general thing little or no attention is given as to where orchards are planted; a place close by the house and as little in the way as possible, enclosing a good place for calves and pigs, 'so that the *ground will not be lost*,' *is the popular orchard spot*.

"As to cultivation: the different modes are good, bad, indifferent, *and none at all*. The past summer has tested the practice of many, and some who plead for clean culture failed to 'show their faith by their works,' for some orchards offer splendid inducements to *rabbits* and a fine site for a *fire*. The best rule is, good cultivation for young orchards, with ground planted in potatoes or some hoed crop, (and not in 'pigs and calves,' as found too often to be the case.)

"As to 'suggestions in regard to planting,' etc.: The preference and practice, I believe, is generally for spring planting, (another mistake, I am inclined to think.) Fall planting has the advantage of better condition of the soil, less danger from drought the summer following. Less trees die from transplanting in fall, and a better growth is obtained; but doctors differ, and people are divided, and nurserymen are often considered as an interested party. The different results following the different times of planting are owing to the differences of the seasons, more than merely spring or fall, and after all nine-tenths of the trees that die are badly handled, poorly planted, and sadly neglected.

"In regard to varieties: It is a subject of prime importance, but has been heretofore overlooked. In planting family orchards, too many early and fall varieties have been planted, and some took for granted that one Apple was as good as another, and *tree peddlers* have accommodated their stock accordingly. I saw one orchard of forty trees, all *Milams*. A commercial orchard near here has the Milam, Rawles' Janet, Ben Davis, Willow, Winesap, and other leading kinds entirely left out, but has a great abundance of Russets (small kinds at that), plenty of summer and largely of fall varieties. It is generally thought, too, that an orchard of a hundred trees should embrace not less than fifty kinds. When we come to consider properly, location, soil, etc., come first; then varieties. If timber land, clay soil, then make selections to suit, including the Bellflower and Northern Spy; plant from two-thirds to three-fourths winter varieties, not less than from five to ten of a kind, in proportion to size of the orchard. Every tree should be carefully root pruned before planting; the ground to be in good order. If in fall, raise mound about the tree eight or ten inches high; if in spring, the ground should be carefully handled to prevent packing, and every tree well mulched at time of planting, with well rotted straw just a little below the surface, and soil put on top; in all cases follow with good cultivation. Splendid orchards may be grown on 'prairie lands;' you don't need to go to the *woods*, as was once thought, to raise fruit, but the eternal fitness of things must not be overlooked or neglected in the selection of varieties, yet 'circumstances alter cases.' Plant young healthy trees from nearest reliable nurseryman.

"But I will not extend this paper, as there is nothing new to members of your Society, and the masses do not read the reports; and this is a free country, and every

man to his own taste. The people love to have men call on them at their own homes and give them lessons in *Horticulture, take* their *orders and money too*, and this is the way they *knock* the *middle men*."

In our own orchards, young trees that have never borne fruit, appeared to be but little injured by the winter, while the older bearing trees of the Cherry, Pear, Plum and Peach were either killed outright or left in an enfeebled, dying condition.

Among Apple trees, the Ladies' Sweet, Talman Sweet, Red Astrachan, Snow, Northern Spy, Striped Pearmain, Bellflower and Winesap appeared to be but little affected. The Rawles' Janet suffered less than varieties supposed to be more hardy. The Fall Pippin suffered severely. Early Harvest was not much injured.

All of which is respectfully submitted.

L. C. FRANCIS.

DISCUSSION ON BOTANY AND VEGETABLE PHYSIOLOGY.

MR. MCWHORTER—I will ask Mr. McAfee to explain a little more fully his essay as to *data*.

MR. MCAFEE—I do not know that I am able to give you a great many facts, although I have seen a great many. One that occurs to me at this moment is this: A verbena seedling, producing fine flowers, with longitudinal strips of red and white, spread over a large surface of ground last season, and there appeared a bunch of buds in a natural leaf, and when they were opened they were dark crimson. The side-shoots that naturally came out produced light trusses of flowers of the same color as usual. The flowers from that particular part, during all the rest of the season, were of the same color—crimson—entirely different from the rest of the plant. The plant, I am sorry to say, was not taken up and preserved. There is no doubt in my mind about that being a bud sport.

I think I could have gone into my garden last season and found a hundred floral sports. I noticed one gladiolus—it was planted, and had six eyes. These each produced a spike of flowers, one of which spikes had flowers of entirely different color and marking from the others. Every flower in the whole spike was the same, but it was so different to those on the other spikes, that it was not simply a variation of the flowers, but it was a sport, and could not have been anything else.

These are the only instances last season that I clearly recollect; but I remember that my wife and myself noticed several.

A well known instance, that has led to the consideration of the subject, is the variation of the peach into a different fruit altogether—the

nectarine. The origin of this fruit is by variation, and not by seedling. I will not say but that nectarines can be produced by seedlings. Variations do not occur so often among fruits as among flowers, because of disturbing causes. The flower has been so thoroughly broken up that it has been extended beyond the season, and it becomes a simple generation of the bud.

Now, there may be very little that is new in this report that I have made. I do not wish to claim any originality at all; but I have never yet seen any similar position taken with regard to classing buds with the spores of the cryptogamia, and as really essential to new generation when the bud is formed; and I think it is a very important point, whether original or not. We cannot properly consider and clearly understand the relation of the bud to the branch, and to the rest of the tree, without we consider it an act of generation.

Take one of our pelargoniums. I take a branch from that and propagate another, and we go on and on. However many times we propagate it—and it may be propagated an infinite number of times—and when seed is used again, though the plant has been so long propagated in a way that is not the natural way, but if there is any thing like fixity of habit, no change occurs. But we know we can change plants by culture, and if so, we can change them other ways. I do not know that the answer will be sufficient, but I think that every one who has seen it will recognize the truth of what I am saying.

Mr. Montgomery—I observed one cutting from the Elizabeth Verbena, the spur of which was perfectly white, while the original plant produced a variegated flower. I have preserved the spur.

Mr Daggy—I have that plant myself, and have observed the sport to exist so that the two colors were distinct on the same plant.

Mr. McWhorter—I have noticed frequently some sports. I have known dahlias of one variety, and especially crimson, and that a considerable portion of the flower would be white or cream color. We had it on our ground for years, and I took some pains to look in ground in another part of the neighborhood where the same dahlia was growing. I saw it had the same tendency there. Now, I did not suppose that there was a fixed character given to it. I suppose the peculiarity of the season accounted for the variation of that dahlia. This matter of bud variation has been to me a tough subject, and I threw out the question for information.

Mr. Bennett—I am sorry that I was prevented from being in to listen to the essay. Upon this subject just before us, I have a word to say. I at one time saw a hickory tree, and at some twelve feet up there was a deer's horn apparently growing, as though it was a limb. I suppose on some sort of examination it might be declared to be bud variation. It looked like a branch. I know that very many of these things that are taken for good observations are something like that in character.

I remember, about three years ago, at Mr. Flagg's residence, seeing a common weed that had changed to white. The color was ordinarily green, tinged with red. I have observed something of the same weed since.

Now, I have no doubt but that the white part of these leaves was simply a disease. In the green-house, frequently, we may see geraniums change color—those that are variegated with white spots—the patches becoming green again when the conditions are favorable to their growth. The hydrangea blossom can be colored at will by the application of proper materials to the soil.

These things must be carefully considered before we jump at conclusions; and yet I do not doubt that there is some such thing as bud variation. The examples given by Dr. Darwin appear to be good; there are others equally good. I have seen elm trees whose branches were more drooping than others, and their leaves of different character. In regard to the buds being analogous to spores, it is proper to recognize them as such.

Mr. Hunt—I have not a hickory tree, but an Early Richmond cherry tree. It has no horns on, however, upon which I can hang any thing that is peculiar. There is one branch that for the last eight years has invariably borne cherries which, while we have been picking the general crop, there have been blossoms and purely green fruit upon this limb. They have ripened about two weeks later than the cherries upon the rest of the tree. In size, in form, in texture, and in taste evidently Early Richmond cherries. This branch starts out from the main tree about two and a half feet above its junction with a Morello stem. This is a tree I got from your Honor when living in Cook county.

The President—Very likely! I have sent out a great many wonders. [Laughter.]

Mr. Hunt—If any gentleman can give a better illustration I will give up the bud variation idea at once.

Mr. McAfee—Have you ever propagated from it?

MR. HUNT—No, sir, I have not, but I intend doing so.

MR. WIER—I have noticed some very peculiar things about bud variation. The most peculiar one is the propagation of the Kittatinny blackberry from root buds. I produced plants, having white berries. The first time I thought there was something wrong, but this last time I made myself very sure. These two productions vary from each other. I do not think there is any fact better ascertained than that of these two instances; they don't resemble the Kittatinny in any point, and don't resemble each other.

MR. HAY—On the ground of Professor Turner, at Jacksonville, there is a weeping willow tree, which has had the top broken off. Its leaves in the lower part are the ordinary willow; but where the top was broken off they are entirely different leaves.

THE PRESIDENT—The Professor said it was struck by lightning, and that after the change it produced the ring-leaf willow at the top. On the Deaf and Dumb Institution's land I once found a peach tree that had the south half covered with nectarines, and on the north half were peaches. I have gathered peaches from that side a number of times.

MR. FOSTER—This subject is very interesting, indeed. Now I should think it would be safe to conclude that a great many of these variations result from external influences, rather than from internal influences, or the nature of the plant. The characteristics of the plant might be toward the outside influence, and the seed be more susceptible of that direction; therefore it would have the power to make the change. I regret very much that our friend, Mr. McAfee, had not preserved that verbena, and gone on to show us whether it was an essential change in the plant, or merely the result of external influences.

MR. MCWHORTER—I will add one little remark. I once had occasion to notice on a Rhode Island apple tree a limb that seemed to hang in a slightly different shape to the other branches, and it seemed to have Roxbury apples on it. I went up in the tree and looked at them, and found that they were truly Rhode Island apples, and while all the apples on that limb were russet they were really Rhode Island Greening apples. My curiosity was excited about the matter, and I took notice the next year. The next year the limb produced one or two apples, but they were not russets—they were green—and the next year the tree was dead.

MR. FLAGG—What makes the difference in our sweet and sour apples, of which a part is sweet and the other part sour?

MR. MCWHORTER—It is a partially diseased condition, which that variety of the family of apples is subject to.

Mr. Flagg—I understand that the ridges are sour and the hollows are sweet.

Mr. McWhorter—The information I had from J. J. Thomas led me to the conclusion that these ridges of different flavor in the sweet and sour apple originated from the way in which the apple was exposed to the light. Some of the apples have more of sweet, and others a great deal more of sour. Some have two ridges of sweet and two of sour. Some would be all one thing. I could not tell the cause, as I have not had much observation of them.

Mr. Avery—In regard to this sweet and sour apple, I have seen apples growing on the same limb, one would be sour and the other entirely sweet; and upon the same apple there would be little spots about the size of the end of my finger that would be very sour, indeed, and usually these sour parts are green. That has been occurring in my father's orchard for fifty years. Grafted from that tree we have several trees growing. The apple is decidedly sweet, with a portion of it decidedly sour, and growing on the same tree, side by side. You will find one limb that is pretty nearly all sour. My father brought it from Connecticut, and grafted it into a young tree. The tree is probably eight inches in diameter.

Mr. McWhorter—This matter having been brought out, it is hardly worth while mentioning that "the apple originated from split buds of the Rhode Island greening and the sweet apple;" that is the way in which it was produced; but horticulturists know these things to be *a myth*.

The meeting then adjourned to half past seven.

DEDICATION OF THE INDUSTRIAL UNIVERSITY.

At half past one, the Society assembled, and, without organizing, repaired to the large hall of the University, to witness the dedicatory services of the new building of the Illinois State Industrial University. These exercises consisted in music by the University choir and the University band, a history of the University by the Regent, J. M. Gregory, LL.D., and speeches by Governor Beveridge, Dr. Wines, of State Board of Public Charities, and others. All the exercises were interesting and instructive, leaving an impression upon the minds of the members of this Society that the University which this Society had so large a part in establishing is doing its legitimate work, and that its influence will be felt at no distant day, in the better education of the industrial classes generally, in the greater dignity of labor, and in a far greater advancement in the arts and sciences.

The University choir sang the following ode, written for the occasion :

LEARNING AND LABOR.

Down the line of struggling ages
  Swells the cry for Truth and Light,
Wrung from bosoms of the peoples,
  Dimly yearning for the Right.
Toiling millions, bravely bearing
  All the burdens of the day,
Supplicate the Ear All-Hearing,
  For to labor is to pray.

Down the line of ages flaming,
  Glow the kindling fires of Thought;
Flashing 'neath the stroke of hammers,
  Light, as well as iron, is wrought.
And the mighty schools of Labor,
  With their problems deep and stern,
Educate the toiling peoples,
  For to labor is to learn.

Thus the Father's wisdom giveth
  Answer from the prayer out-wrought:
From the furrowed fields of Labor
  Come the harvest sheaves of Thought:
And from out the line of ages
  Gleams the truth of Christly birth,—
Learning incarnate in Labor,
  Shall regenerate the Earth.

Then to Labor and to Learning
  Let us consecrate these halls;
Lo! they come as God's strong angels,
  Bringing light and breaking thralls;
Kindling in us hopes supernal
  Of a glorious coming time,
When the love and might eternal
  Shall work out God's will sublime.

SECOND DAY.

EVENING SESSION.

The Society re-assembled at half past seven, in Eichberg's Opera House.

Mr. NELSON moved that the Society occupy this room for the remainder of the session, which motion prevailed.

REPORT OF STANDING COMMITTEE ON ENTOMOLOGY.

Prof. C. V. RILEY then proceeded to deliver his Lecture on Entomology.*

The report of Dr. WM. LE BARON, of the Standing Committee on Entomology, was presented, and, at the request of the Secretary, was read by Prof. McAfee. It was as follows:

AN ADDRESS UPON NOXIOUS INSECTS IN GENERAL, AND UPON CERTAIN SPECIES IN PARTICULAR.

BY DR. WM. LE BARON, STATE ENTOMOLOGIST.

After a severe and well-fought battle, or a hard and protracted warfare, it is interesting to look back over the field of conflict and see how we stand, what we have gained, and what lost; where our struggles have been crowned with victory, and where we have been marred, or perhaps ruined by defeat.

So, in the perpetual conflict between man and injurious insects, it is interesting and useful, from time to time, to take a retrospective view for the purpose of determining how far we have been successful, and in what we have failed, and what yet remains to be accomplished.

As no new noxious insects of serious importance have come to my knowledge within the past year, I propose, on this occasion, to pass in review a few of our old acquaintances among the more notoriously injurious insects, and see how we stand affected towards them at the present day. But before doing so, it will be interesting, for a few moments, to take a more general view of the subject, so as to be able to form some estimate of the extent of the field, and the number of the insect enemies with which we have to deal.

As insects are injurious to us in every variety of degree, from those which sweep whole harvests before them to those which do little more

* This Lecture, not having been furnished to the Secretary in time for insertion in its proper place, will be found farther on in the volume.—SEC.

than mar the beauty, without seriously damaging the value of the crop, it is impossible to state very definitely the number of species which should be admitted into this category. If we take as our guide in this matter those species which the writers upon noxious insects have thought proper to admit into their works, we may state the number of injurious species, in this country, to be about five hundred; and from these, one hundred might be selected, which would include all those species which can be said to be seriously injurious, either to the farmer or to the horticulturist.

When we come to examine these hundred species in detail, we find that they can be usefully divided into three classes, which we may designate as first class, second class, and third class noxious insects, according to the extent and severity of their depredations. All injurious insects outside of the hundred might be thrown together as a fourth class.

I admit into the first class of noxious insects only those species which are so destructive and so generally diffused that, if left to themselves, they would wholly, or at least in great part, prevent the raising of those fruits or other crops upon which they depredate. Of the one hundred selected species, only about ten would come into the first class, about forty into the second, and the remaining fifty into the third class.

Of these one hundred species, twenty-seven are Coleoptera, or beetles, and their larvæ; thirty-five are caterpillars, or larvæ of the Lepidoptera; three belong to the Orthoptera, or grasshopper order; four to the Hemiptera, or bugs proper; twelve to the Homoptera, including the leaf-hoppers, and the leaf and bark lice; four to the Hymenoptera, or wasp and bee order; and fifteen to the Diptera, or two-winged flies.

We moreover find that fifty-two, or a little more than half, are injurious to fruits or fruit trees; twenty-six to vegetables; fourteen to grain; five are general feeders; and three are injurious to the domestic animals.

Of the fifty-two species injurious to fruits, there are injurious to the apple, sixteen; to the pear, five; to the peach, two; to the plum, two; to the quince, one; to the grape, seventeen; to the currant, four; to the blackberry, one; to the raspberry, one; and to the strawberry, three.

Of the sixteen species injurious to the apple, four belong to the first class, namely, the round-headed borer, the codling moth, the canker-worm, and the oyster-shell bark-louse. Four belong to the second class—the flat-headed borer, the apple curculio, the tent caterpillar, and the apple root-louse. The other eight belong to the third class, besides which there is a considerable number of minor noxious insects which come into the fourth class.

Of the five species more or less injurious to the pear, none are of the first class, two are of the second classs—the pear flea-louse, (*Psylla pyri*) and the lined plant-bug, (*Phytocoris lineolaris*), and three of the third class.

Of the two species injurious to the peach, both are first class, the plum and peach curculio, (*Conotra-chelu nenuphar*), and the peach-root borer, (*Ægeria exitiosa*).

Of the two species injurious to the plum, one is of the first class—the plum curculio, just mentioned; and the other of the second class—the plum-gouger, (*Anthonomus Pruncida.*)

The species injurious to the quince is the quince curculio, (*Constrachelus cratægi*). This does not probably rank above the third class. Besides this the foliage of the quince is sometimes damaged by several kinds of caterpillars, which must be placed in the fourth class.

Of the seventeen species injurious to the grape, none can be called first class in this country. That is to say, there is no species of insect in this country which generally and extensively interferes with the raising of this fruit. But in Europe, the grape-louse (*Phylloxera vastatrix*) would undoubtedly take the rank. Of the seventeen species referred to, scarcely more than three can rank as high as the second class. These are the steel-blue beetle, (*Haltica chalybea,*) the grape leaf-hopper, (*Tettigonia vitis*), and the grape root-louse, (*Phylloxera vitifolia.*) The other fourteen, including the large Sphinx caterpillars, the blue caterpillars of the vine, the grape codling, and others, could hardly rank above the third class, though with respect to some of them there would probably be a difference of opinion even amongst competent judges.

Of the four species injurious to the currant, none are of the first class, one of the second class, namely, the imported currant saw-fly, (*Nematus trimaculatus,*) and three of the third class. In particular localities the imported saw-fly has rendered the raising of currants an impossibility, and its damages have therefore attained first-class proportions, but the species has not become sufficiently diffused to raise it to a primary rank in a general enumeration of injurious insects.

Of the three species injurious to the strawberry, two may be admitted to the second class—the strawberry crown-borer, (*Analcis fagariæ,*) and the strawberry leaf-roller, (*Anchylopera fragariæ,*) the other species, the strawberry black-bug (*Coreomelas pulicaria*) would fall into the third, or even fourth class.

Of the insects injurious to the blackberry and the raspberry, I have placed but one species as high as the second class in point of injurious qualities, and this is the raspberry borer, (*Saperda* (*Oberea*) *tripunctata.*)

We have not time to specify the twenty-six species referred to as being injurious to vegetables. We can only say, in passing, that there is no cultivated vegetable, with the exception, perhaps, of the rhubarb, or pie-plant, which has not its one at least, and usually its two or three seriously injurious insect depredators.

In the selection of one hundred species of insects most detrimental to human interests, we have included fourteen as being injurious to grain. These are, of course, the most important of all, for the obvious reason that we are dependent upon the production of the several kinds of grain not only for our bread, but also, in a great measure, for our meat. It is a remarkable fact that though many kinds of insects are more or less injurious to grain, probably nine-tenths of all the damage done, is effected by three species, which therefore take the first rank in the list of injurious insects. These are the chinch-bug, (*Micropus leucopterus,*) the

Hessian-fly, (*Cecidomyia destructor*,) and the wheat-midge, (*Cecidomyia tritici.*) The others would mostly fall into the third and fourth classes, though a few, which are sometimes quite injurious to corn and wheat in the granary, might, perhaps, be properly regarded as having a second class importance.

We have referred above to five species of seriously injurious insects, under the head of general feeders. These are not confined, like most insects, to some one kind of tree or plant, but feed more or less indiscriminately upon whatever comes within their reach. In this category we include, first, the white grub, or larva of the common May-beetle; second, the *Caloptenus spretus*, or the destructive grasshopper of the western plains; and this may be taken as a type or sample of a number of somewhat similar but less destructive species; third, the army worm (*Leucania unipuncta*); fourth, the stalk-borer, which is the larva or caterpillar of the *Gortyna nitela:* and fifth, the cut-worm, under which general or generic term I include a number of closely allied species, all of which are the caterpillars of a family of moths known as the Agrotidæ. None of these general feeders, however, are sufficiently destructive, nor so generally diffused as to rank as first class noxious insects; but they all may be properly admitted into the second class.

Of the insects injurious to domestic animals, we admit but three into the selected list of one hundred species, and these are the bot flies, respectively, of the horse, the ox, and the sheep. The bot fly of the sheep may, perhaps, be admitted into the second class, but those of the horse and ox can not rank above the third class. Indeed, it is an unsettled question whether the bot fly of the horse is ever seriously injurious to that animal; but it may very properly be admitted into the list on account of its very curious history, and the uncertainty which still attaches to its real influence upon the horse.

The above enumeration, my friends, will give you a general idea of the number and comparative importance of the more serious insect foes with which you have to deal, under the respective heads of fruit insects, grain insects, insects injurious to vegetables, general feeders, and insects injurious to the domestic animals.

I commenced this lecture by saying that it is sometimes useful to take a retrospective view of the field of conflict in which we are engaged, and to see how we stand. I propose, in the time that remains to me, to take up in detail some of our most notorious noxious insects, and see how we stand affected towards them at the present time. The principal agencies antagonistic to the spread of insects may be stated to be the four following: First—climatic influences; second—insectivorous birds, and other animals, including predaceous insects; third—parasitic insects; and fourth—human instrumentality. It will be interesting to pass in review a few of the more important insects with reference to each of these sources of opposition.

First—*The Apple Worm, or larva of the Codling Moth.* This insect passes most of its life, either in the substance of the fruit, or in a compact cocoon more or less deeply protected under the bark of the tree, or in

some other secluded situation. It cannot be supposed, therefore, that at these times it can be materially affected by meteoric influences. But it is very possible that unusually cold or violent storms occurring at the time the parent moth is depositing her eggs, may seriously interfere with the accomplishment of that purpose, and this, in the absence of other known causes, may help to explain the well known fact that the codling worm, like all other insects, is much more abundant in the same locality, some years than others.

The codling worm, whilst in the fruit, is also in a great measure protected from all natural enemies, both predaceous and parasitic. A few of them are known to fall a prey to the parasitic ichneumon flies, whilst they are in the pupa state, and when their covert, it may be presumed, happens to be rather superficial and exposed. But the only really efficient enemies of the codling moth are the woodpeckers, which, during the long wintry season, depend upon just such hidden larvæ as these for their subsistence. With respect to human methods of opposition, the only one much relied upon is that of capturing the worms under bands put around the trees at the times when they are leaving the apples, and seeking a covert for transformation. Great numbers of worms can be easily caught by this method. But, regarded from a general point of view, as a means of combatting the codling worm, it fails in two important respects: first, we do not capture the worms by this method until after they have effected all the damage they are capable of, and have voluntarily deserted the ruined fruit. Its benefit is altogether prospective, with the view of lessening the number of the succeeding brood. Secondly, however persistently practiced, it cannot be expected to be very effective unless the orchard in which it is used stands at a considerable distance from other orchards, or unless there is a community of action among all the neighboring orchardists; a co-operation, however, upon which experience teaches us we can rarely depend. I do not wish to be understood as discouraging this practice. On the contrary, it is a method so easily put in operation, and so cheaply, too, if we use paper bands instead of cloth, and it may be made so effective by associated action, that we strongly advise, not its abandonment, but its more general and persistent practice.

SECOND—*The Plum and Peach Curculio.* Injurious insects are of all grades. Some only act the part of pruners, and if the crop is very abundant, they become useful by reducing the number and improving the quality of the fruit. Others go a step further, and seriously damage the crop, but graciously leave a modicum, more or less, for the owner. They apparently do not wish to wholly discourage the proprietor from continuing to raise those crops which they find so conducive to their own comfort and subsistence. But the plum curculio takes the whole. If left to his own devices, he does not leave a single plum, and rarely a single peach. He makes no compromises; he enters upon a war of extermination. It is man *versus* curculio, and it is about nip and tuck between them. So far as the plum is concerned, we have virtually abandoned the field, and left the little Turk in undisturbed possession. In the domain of the peach, the conflict is still maintained. Like all protracted wars, this has come

at last to be a question of finance. Man can hold the curculio in check if he is able and willing to spend time and labor enough in the operation It is simply a matter of dollars and cents. But the worst of it is that the war seems to be interminable. The Turk never retreats, and he never surrenders. He is like an old general we used to read of in the Mexican war—if he is beaten, he does not know it. The destruction of the curculio has for many years formed a part of the regular estimate of expenses in raising the peach. Col. Forbes, of South Pass, estimated that it cost him about seven cents per tree, or seven dollars per hundred, for the season. But Col. Forbes is a man of great energy and systematic industry; and Mr. Paul R. Wright, and other intelligent horticulturists with whom I have conversed, consider that in the case of most peach raisers, this estimate is too low. Perhaps ten dollars per hundred may be taken as a reasonable estimate. The two established methods of contending with the curculio are, capturing them under chips, which is most effective early in the season, and subsequently jarring them down upon sheets spread over a movable frame, and universally known as the Curculio-Catcher. These methods are too well known to require description. I will only remark that the old bumping machine is now being superceded by a smaller and lighter canvas, which is borne upon the person of the operator, the branches over it being struck with a mallet. The advantages of this modification are, that it is less expensive; it is held more directly under the jarred limbs, and therefore fewer of the insects fall outside of it, and it can be used upon old and rigid trees, and upon rough ground and hillsides, where the use of the old machine is difficult or impracticable. Experience has shown that we cannot calculate much upon the operation of natural agencies in aiding us in our contest with the curculio. As to climatic influences, there is some reason to suppose that a dry period following a wet one may sometimes so harden the ground as to imprison within it the larvæ which have entered the earth for the purpose of transformation. This view seems to be corroborated by the well-known circumstance that curculios, after having been comparatively scarce, sometimes swarm in great profusion immediately after a warm rain. But if this condition of things ever occurs to any considerable extent, it can only be in stiff, clayey lands.

These insects are known to be destroyed, to a moderate extent, by natural enemies, both predatory and parasitic, but not so as to perceptibly diminish their numbers.

THIRD—*The Canker Worm.* This insect, though less generally diffused the codling worm or the curculio, yet wherever it does get a foothold, is one of the most troublesome and inveterate enemies that the orchardist has to contend with. They have been steadily on the increase, for a number of years past, in several of the more northern counties of this State, where they have already ruined a considerable number of orchards, and where they bid fair to destroy many more. When canker worms once get a foothold in an orchard, they usually hold it with a fatal grasp, and do not cease their depredations until the death of the trees, and their own consequent starvation closes the scene.

They are one of the most hardy of insects, making their appearance sometimes before the frost is wholly out of the ground. They seem therefore to be fitted by nature to bear with impunity great vicissitudes of weather. I have seen them overtaken by cold storms of rain and snow, after they had begun to move in the spring, but without being apparently affected by them, any farther than to be rendered torpid for the time being.

Though this insect is usually so persistent where it once becomes established, there is a considerable number of cases on record of its rapid disappearance, from causes partly known and partly conjectural. This destruction of the canker worms has sometimes been attributed to a continuation of cold rains after the hatching of the young worms in the spring; and although, as we have stated above, they are capable of enduring great vicissitudes of weather, it is possible that they may be so crippled at this early period of their lives, as to fail to attain a healthy maturity and the power of propagating the species.

Much efficacy has also been attributed to several species of birds. Dr. Trimble, of New Jersey, gives great credit to the cedar bird, also known as the cherry bird, as a depredator upon the canker worm. There are four orchards in my own town of Geneva, in which this unwelcome visitor has established its residence. One of them has been utterly destroyed through neglect. In another the insects have not made very serious headway. This is attributed by the owner to flocks of birds which, from his description, I take to be cedar birds, and which have acquired the habit of returning annually to this orchard at the time the canker worms are becoming destructive. The history of one of these orchards is peculiar and interesting. In the summer of 1871, the insects first attracted the attention of the owner by destroying about half of the foliage. In 1872 they had become greatly increased in numbers, and almost completely defoliated it. At this time the owner first called my attention to its forlorn condition. As in some cases of human sickness, the party most interested neglected to call in the doctor until the patient was *in articulo mortis*. But as in cases of severe sickness it is the established axiom that as long as there is life there is hope, so in this case I determined to make a final attempt to save the patient, and I will not deny that I felt a secret pleasure in having this opportunity to try a desperate expedient which I had long been revolving in my mind, and to which the only objection was, that if the disease did not kill the patient, the medicine probably would. The owner entered heartily into the experiment. He said he considered the case desperate, and he had as lief have the patient killed by calomel or arsenic, as to let him die of worms. He also cheerfully agreed to pay all expenses, and thought himself fortunate in having a physician who is paid by the State, so that, at all events, he would have no doctor's bill to pay. The remedy here referred to is that of scraping off the scales of bark soon after the moths have deposited their eggs beneath them, and then anointing the trunk and larger branches all over with kerosene oil. I have no doubt that this would prove an effective cure for the canker worm. The expense would

not be very great, and the whole thing could be accomplished by one operation. The question is, would this application injure the trees. My experiments go to show that it would not; but these experiments have not been conducted upon a sufficiently large scale to give entire confidence. The full trial which I was upon the point of giving to this method, in my fellow-townsman's orchard, was prevented and rendered unnecessary by the sudden and unexplained disappearance of the canker worms from it. Upon visiting the orchard in the present spring of 1873, shortly after the usual time of egg deposit, and after an hour's diligent search, only two or three clusters of the eggs could be found. What had become of the insects and their eggs we could only conjecture. One possible explanation was that the worms had destroyed the foliage so early in the previous season that they failed to become matured. Another, and we think more probable explanation was that the worms may have been destroyed by blackbirds, large flocks of which the owner recollected to have seen frequenting the trees the previous summer; or they may have been destroyed by parasitic enemies, several species of which are known to infest them. This experiment, however, I hope, at an early day, to see put to a thorough trial.

FOURTH—*The Oyster Shell Bark Louse.* I can dwell but a few moments upon this long and well known insect. The oyster shell bark louse has always been regarded as an imported species, but they are sometimes found in situations to which it is very difficult to explain how they got access, if they come from abroad. The uncertainty is enhanced by the difficulty of distinguishing and identifying closely allied species of insects, when they occupy a low place in the scale of insect life, and when in consequence of the simplicity of their organization, but few salient points of comparison exist. There are several species of the genus Mytilaspis, to which the apple bark louse belongs, one of which is found upon the linden or bass wood, and another upon the Persian lilac, which so closely resemble the apple species that it is impossible to tell whether they are really distinct species, or only plant varieties of the same; and the same uncertainty exists respecting many allied species in the extensive family of Aphides, or plant lice. The common *bean aphis*, for example, has been described as a distinct species, under no less than sixteen different names, taken from the plants on which it happened to feed. It is known to most persons who have taken an interest in such enquiries, that for some ten years or more, the oyster shell bark louse has been on the decline. There is no reason to suppose that this has been owing in any appreciable degree to climatic influences. The known number and activity of its insect enemies, both predaceous and parasitic are fully sufficient to account for it. Its destruction, south of the 42d parallel of latitude, has been almost complete; and north of that line, it appears to be in process of diminution, if not of absolute extinction.

In this removal of what was once the most dreaded scourge of the orchardist, man himself has played but an insignificant part. His remedial appliances have been scattered, intermittent, partial, and altogether inadequate. He has, indeed, done little more than look on, a deeply

interested but impotent spectator, whilst the conservative and almost invisible agencies of nature have moved silently forward to their beneficent consumation.

We have time to refer to but one more species of noxious insects, and that shall be—

Fifth—*The Colorado Potato Beetle.* It is a well known fact that almost all our injurious insects have come from the East, and many of the most destructive of them have been imported from the other side of the Atlantic. This is readily explained by the circumstance that the tide of emigration has set from east to west, and injurious insects have followed in its wake, increasing in numbers in proportion to the extent to which those crops upon which they respectively depredate, have been cultivated. The Colorado potato beetle is the only insect of a serious character which has come to us from the West. The destructive grasshopper of the western plains is also an originally and exclusively western species, but it has never yet crossed the Mississippi river. The Colorado beetle stands alone in the suddenness of its advent, the rapidity of its spread, the uniform persistency of its operations, and the totality of its destructiveness to the crop upon which it feeds. In the last respect it stands in the same category with the plum curculio. When unresisted it takes the whole crop. We cannot afford to do here as we do in many other cases, let things have their own course, and content ourselves with taking what our insect enemies leave; for the potato beetle leaves nothing but the stubs of the vines. The farmer, therefore, is compelled to give to this insect his very particular attention, and to resist it with all his forces, and all his ingenuity, or else abandon the crop. It is unnecessary here to enumerate all the devices which have been employed to destroy this insect. They have all been for the most part superseded by the use of the Paris green; and since it has been found that this article can be used about as effectually in the liquid as in the powdered form, the most serious objections to its use have been obviated.

In their march eastward these insects have reached many of the western counties of New York, Pennsylvania and West Virginia, and they were found in considerable numbers, the past summer, in one locality in the District of Columbia. The reports as to their prevalence in the Western States, in the present year, have been very much as in the two preceding years, very conflicting, or rather very serious in different localities. It is evident that they must yet be regarded as noxious insects of the most serious character.

The natural agencies to which we can often look with confidence to relieve us from the inflictions of noxious insects, seem to make but little impression upon these unwelcome visitants from Colorado. Thick-skinned, stolid, imperturbable, and doggedly persevering, they seem determined to fight it out upon the line which they have adopted, though it may take, not one only, but many summers. The intense mid-day sun sometimes scorches them to death when they chance to get knocked down upon the burning sand; the lady bugs nip them in the bud by devouring their eggs; the *Arma spinosa* impales them upon its spear; the Tachina

plants its fatal ova upon their backs; and the ferocious Asilus occasionally swoops down and carries them away; but all these enemies seem to be little more than skirmishers on the flanks of the grand army of the Colorados, which has marched steadily forward to its destination, till the latest advices report its vanguard within a few leagues of the capitol of Washington.

We remarked, in speaking of the bark louse, that in its removal natural agencies have done much, and man but little; but in combatting the potato beetle, this is reversed. Though, as we have just seen, it has many natural enemies, they do not appear to be sufficiently numerous to check its multiplication to any very appreciable extent, except, perhaps, in a few localities. Its destruction, on the other hand, by hand-picking, by machinery, and by Paris green, has been of the most wholesale character, and, if persisted in, as it undoubtedly will be, from the necessity of the case, cannot fail ultimately to make a very decided impression upon their future increase and diffusion.

The law of nature is harmony, or a just corelation of all her forces, and in all her departments. But this harmony is liable to frequent disturbances, and wherever such occur she proceeds at once to rectify them; sometimes, by special provisions, such as the agency of parasites in the insect world; and sometimes by the slow but sure process of retribution, by which the disturbing elements are eliminated, even though it involves the death of the offending members. I have seen, for example, an isolated orchard in which the notorious canker worm had established its fatal residence. Year after year its beauty waned and its vitality abated, till at the close of the fourth year three-quarters of the trees were dead, and there were not leaves enough upon the remainder to afford sustenance to the famishing insects. The next year, not a leaf nor an insect were to be seen. The cure was complete. The owner may now plow up his orchard and plant it anew, for the enemy has been effectually removed by the process of last resort—the remedy of death.

So it is in the moral world. The greatest evils, if left unrestrained, will ultimately destroy themselves. Debauchery, licentiousness, dishonesty in business, unprincipled speculation, and all other vices, if not checked, become ultimately exterminated by the terrible diseases and demoralization which inevitably follow in their train. Any country or city which harbors these vices beyond a certain degree, must perish by a process of inherent dissolution. Such was the fate of Sodom and Gomorrah, of Babylon and Ninevah, of Rome and Athens; and the destruction of other cities, now flourishing, from similar causes, may, perhaps, be only a question of time.

And thus it is that nature is ever tending to restore her lost balances, slowly it may be, but surely; and we find that we can often save ourselves from much loss by assisting her, or by co-operating with her; and here it is that the work of the entomologist comes in. In many parts of the field we can put our light artillery into play, and hold the enemy in check, till nature has time to bring her heavy ordinance into position. And it is thus only, by availing ourselves of every instrumentality, and bringing

all the forces within our knowledge into combined and harmonious action, that the greatest and best results can be obtained.

DISCUSSION ON ENTOMOLOGY.

Mr. McWhorter—With regard to the canker worm, my friend, James Smith, of Iowa, had large experience, and he told me that the only remedy he had succeeded with was putting coal tar at the root of the tree, to prevent the ascending of the female moth. He put it on the bark, right around the root. I went to look at the trees, and I thought I could see some evidence that the trees had been injured by the coal tar. He said they might have been, but he did not think it was as much as they would have been injured by the canker worm.

A Member—I would like it described.

Mr. Riley—It is of a green and brownish color, and sometimes black, from one to one and a quarter inches long, and having but four legs it always loops in walking. The moth is peculiar, from the fact that the female has no wings, and must climb up the tree; hence the remedy mentioned is evidently a good one, though I should not advise it, as there are many other remedies which are good, not now necessary to describe.

I would make these remarks on the paper just read. From the fact that Dr. Le Baron is older than I am, and that he is not present to discuss the points taken more fully, I shall not enter minutely and generally upon an examination of them. A few, however, should be noticed. I have, perhaps, traveled around the country, within the past year or two, more than Dr. Le Baron has, and consequently my opportunities for observation have been in some measure greater than his.

In stating that the natural enemies of the Colorado potato bug have been of little use, I think he is entirely wrong; for notwithstanding that it holds its own, it does not increase. These enemies have increased greatly, until at last they do keep it down, much more than they did five or six years ago.

Then, again, though his classification of insects is a very good one, yet it is not at all reliable as a fixed rule of classification. We must not forget that an insect which this year would be set down as of the fourth class, might next year be set down as first class. The queen aphis is not mentioned in the category, and so again the raspberry root borer is not mentioned. Moreover, what is first class in one portion of the country will not be so in another; so that we cannot avail ourselves of the classification.

Now, in relation to the horse bots, I have had too much to do with them to acknowledge that they are not a great injury to the horse, and I

regret that Dr. Le Baron is behind the times in regard to these insects. I do not know that I wish to say any thing more.

Mr. Bourland—Is that canker worm the insect which has destroyed the forest trees of late years?

Mr. Riley—No, sir; there has been a worm of an entirely brown color in Indiana, which preys upon nearly all forest trees. The moth is a pure white—not gray like the canker worm.

Mr. Bourland—I refer to the canker worm that has been so destructive to the elm trees.

Mr. Riley—Oh, yes! that is it.

Mr. Greene—Have you had your attention called to a worm which has devastated the clover, and, in some cases, the cornfields in Tennessee, and then fed on every thing around. The past year it stripped the peach trees almost completely bare.

Mr. Riley—No, sir; my attention has not been called to it, although I think I have seen some acconnt of it in the newspapers. There is the "hateful grasshopper" to which I think Mr. Le Baron refers. He objects to that name. I think it is a good name. The flat-headed borer is far more injurious than the round-headed borer in Missouri.

Mr. Hay—Three years ago, we had six acres of potatoes, and four acres were badly affected by the potato bug. I got five pounds of Paris green to apply to them; but I found these soldier bugs were so numerous, and were destroying the potato bugs so rapidly, that I did not apply the Paris green, and there was not a potato bug left in two weeks. But there is a long small beetle, with red legs, which gets hold at the back of the head, and eats the head off the potato bug, in the first place. Now the soldier beetle will take them anywhere, and suck them as dry as a chip. I frequently go over to a creek near by, and collect these army bugs, and I think they have about destroyed the potato bug with us.

Mr. Riley—I have seen a potato field in which the true parasite of the potato bug was so numerous that it looked as though a hundred swarms of bees had been set loose; and there was not a potato bug to be seen, nor a larva.

Mr, Hay—I think the grasshopper spoken of by Mr. Greene is our own grasshopper. They are very severe on tomatoes; four acres of clover they completely stripped, and they took all our sweet corn. They stripped the leaves from the apple and pear trees, and flowers, and then got on the beets.

Mr. McAfee—I am told by a gentleman who lives in the near vicinity, that there came a flock of these "hateful grasshoppers" on wings of

the wind, and alighted on the Cincinnawa Mound, northeast of Dubuque, in Wisconsin; but how long they stayed there, I could not tell. I had heard that they never crossed the Mississippi, and I was told by Dr. Walsh, one time, that they never could cross, so that I thought this was a very peculiar instance.

As to the canker worms, they are very dark in color, nearly black; and in the woods, not three-quarters of a mile away from me, the elm trees were as badly defoliated by them as the apple trees.

A MEMBER—Do you consider the two bot flies that infest horses as very troublesome?

MR. RILEY—There is only one bot fly that attacks horses, and it is injurious.

THE SAME MEMBER—In what respect does it injure the horse?

MR. RILEY—By sometimes penetrating the coat of the stomach, and by the large amount of nutrition they use when in large numbers.

THE SAME MEMBER—How does it attack the horse? You say there is only one.

MR. RILEY—There is only one. It deposits its eggs on the hair of the legs, and about the flanks, where the horse can lick them off with his tongue.

THE SAME MEMBER—There are some that attack the horse under the chin. If the horse hears the sound of this bot within ten feet of him, he becomes uneasy, but when that one comes that attacks the flank, it does not appear to disturb him at all.

MR. WIER—To destroy canker worm, I would suggest the propriety of trying a solution of arsenic, or Paris green, thrown over the foliage with a syringe.

MR. GALUSHA—I made quite a little journey this summer, to see an orchard which was infested with canker worms, with a view of ascertaining by experiment whether it could not be killed with a solution of Paris green. When I arrived there, I saw a large orchard containing hundreds of trees, and only a few trees that had a visible leaf on them. In passing under these trees, I was glad to get away, for I could not rid myself, for a long time, of the worms on my clothes. I gave it up as a bad job, and turned my back upon the orchard. The orchardist informed me the worms had been increasing on him year after year, and he was going to dig up his orchard.

MR. BOURLAND—The canker worm in the East has been nearly destroyed by the introduction of the English sparrow.

MR. FOSTER—The canker worm got into my orchard one season, and I took my men and teams, and hauled some straw under the trees. I studied upon the subject one day, and I brought my big artillery to bear, and destroyed them completely with fire. On a still, calm day, using a good deal of caution, there is no need of damaging the tree. Before I got there, the wind changed a little, and my men managed to burn two or three trees, but I saved the orchard. Now, that is a simple remedy. Take a little dry straw, set fire to it, go from tree to tree with the team, and you may shake them all down into the fire. It is simple, effectual, and easy, but it wants a good deal of caution. In the orchard where Mr. Galusha went, the same thing might have been done.

MR. MCWHORTER—The canker worms have been in several localities in my district. I have good evidence of their being in Mercer county. How they got there I do not know; but they existed and disappeared again without any apparent reason. They have been there since then and disappeared again, for no known reason, and there was no particular means taken to combat them, and there was no Mr. Riley there to find out what was the cause.

MR. HUGGINS—I have been a close observer of the canker worm for many years. For quite a number of years there was a small orchard opposite to me that was neglected, and finally the canker worm got into it. I felt uneasy about it, though they never troubled me to any extent. This orchard became so much infested that the one Mr. Galusha speaks of reminded me of it. The remedy was scraping the trees at the time the eggs were laid, turning in hogs, and cultivation. I have great faith in late fall plowing for the canker worm, and turning the hogs in. That is the only remedy that I know of for them. This orchard has fallen into the hands of people who are careful in cultivation; there is no grass in it, and it is plowed in the fall and every thing kept down, and the canker worm has entirely disappeared. I do not know that our leading scientific entomologists would agree with me, but I have faith in that plan.

MR. RUTZ—Five years ago I feared that the canker worm would take my orchard. The next year we sowed it with oats and turned the hogs in, and the canker worm has disappeared, as far as its effects are concerned.

MR. FLAGG—I had it in my orchard once, but not to any great extent, and it disappeared just at the same time the orchard was plowed, being in this case an early spring plowing. I do not know whether it was caused by the plowing or not, but I always thought so; and Dr. Hull has told me that he thought in two cases he had destroyed it by plowing.

Mr. Riley—I do not know that any subject of much more interest could be discussed. I have in my second report, four years ago, given my opinion on this subject, and shown by experiment how late fall plowing is beneficial in destroying the canker worm. I showed that the stirring of the earth is destructive to it, because the chrysalis is more apt to rot and die from exposure to the severe cold, etc. This late fall plowing —and it need not be more than five or six inches deep, is beneficial in exposing many of them to the attacks of birds, and if you have hogs in it you will kill them all—not that the hogs search for the insects, because they are so small—but they do destroy great numbers of them.

I agree with all that has been said, not only as to this plowing, but as to scaling the bark, and Mr. Foster's remedy is a very good one; but there is a better remedy than all these. When an insect can be as easily managed as this can, which is obliged to crawl up the tree, why not take advantage of this habit? If you will draw around your tree, a foot or so from the ground, a piece of rope, and then draw around that a narrow strip of tin, not more than two or three inches wide, and tack them on, you have an effectual barrier against this canker worm. They will not pass it; they *may* fill up underneath that ledge until some of them get on the top, but they will go round and round, and will not think of getting up the tree. Now the eggs will be deposited under this tin, and the best way of destroying them is by kerosene oil. If you do this you will not have to go to work knocking the worms down, or burning them or your trees. I would also use those preventive measures which Mr. Huggins and others have found so useful.

Mr. Flagg—This might do for amateur purposes, but for practical orcharding I think you might do with late and early plowing. Many of us think it is the best time for plowing either quite late or quite early, especially if you are putting in oats. I have no doubt the remedy mentioned by Mr. Riley would be entirely successful, but I do not think it would be possible to apply it extensively.

Mr. Riley—Plowing is very good, but it will not accomplish the whole of it. You will find more chrysalides between the forks of the roots than you will find five yards away from that.

Mr. Burrill—Last summer I was at Barville, where half a dozen sparrows had been imported and had multiplied very greatly; and they had destroyed not only the canker worm, but lots of other kinds of worms. It was really delightful to see the fine condition of the orchards.

THE PRESIDENT announced as the Special Committee to examine the collections of insects made by students at the Illinois Industrial University, and to adjudicate upon the prizes offered therefor by the Society, J. Huggins, D. B. Wier, and E. Daggy.

REPORT OF STANDING COMMITTEE ON METEOROLOGY.

PROF. J. H. TICE, a member of this Committee, sent his report to the Secretary to be read. It is as follows:

METEOROLOGY.

Mr. President, and Gentlemen of the State Horticultural Society:

At the request of your Secretary, I have prepared and present to your Society a paper containing a few thoughts on the important and ever interesting subject of Meteorology.

Its intimate connection with, and controlling influence over the happiness and welfare of our race, makes a knowledge of it a necessity. Man's dependence for subsistence upon the products of the soil is absolute. The soil, in a natural state, however, produces but sparsely the necessaries of animal life, and those of the coarsest kind. But whatever in the season of vegetation is spontaneously produced, must be gathered, preserved and housed for supplying animal wants in the non-growing season. Man and the domestic animals would be restricted within narrow limits on the globe, for not even all the belt covered by the torrid zone would be habitable without this providence for the future. Articles of prime necessity, namely, those serving for food, are very perishable, must be gathered in season when mature, and in a favorable state of the weather. Left exposed to the elements, either from negligence or want of foresight, they soon deteriorate and decay, becoming unfit for animal subsistence. This is generally true of the coarse, spontaneous products of the soil; but of the delicate and choice products of agriculture it is absolutely true. These are man's nurslings, incessantly requiring his tenderest care, most effective protection, and keenest foresight. He must neither expose them while young and tender to the late frosts of spring, nor when mature to the early frosts of autumn. In harvest time he must conduct his operations so that rain and unfavorable weather come not when he is unprepared, for in case they do, in a day the labors of a whole year may be destroyed and lost.

Nature never acts arbitrarily. She has her functions to perform as well as man has his. He cannot control her, and it is not desirable that he should. She must therefore control him, but he can be a co-worker with her, and they can amicably and harmoniously work together in the achievement of the same purpose and great end. But to do so he must be in sympathy with her and have formed the most intimate relations with her, so that he can hear the very throbbings of her heart; not only comprehending her meaning, but able to interpret what she writes upon the earth and on the sky for his information. In the operations of Nature, as well as the affairs of men, "coming events cast their shadows

before," for the frost does not descend, nor the wind blow, nor the rain fall, without a premonition announced hours, often even days, in advance of their coming. This is well understood by the keen sons of trade, and they enlisted the aid of the General Government by inducing it to establish the Signal Service Bureau for observing atmospheric phenomena over the entire continent and the adjacent islands; and when danger is approaching, to hoist signals along the shores and coasts of the sea and lakes as a premonition that a storm is imminent. Millions of property and thousands of valuable lives are by this means annually saved from shipwreck and disaster by the timely warnings of the Signal Bureau.

The cultivator of the soil, the prime creator of the world's wealth, has no such friendly assistance, warning him of impending danger, in heeding which he can fortify himself against loss.

Facilities for his information are ready, and those who control them are willlng and anxious that he should have their benefit; but the question to be solved is how are they to be made available? The mariner reading his barometer, seeing the mercurial column descending, steers for the nearest headland, and sees the signal hoisted, telling him from what quarter the danger is approaching, or to be apprehended, and he prepares to meet it by taking in sail, or tacks his ship, and avoids the storm by running out of its track.

The farmer has yet to learn both the value of the barometer to his calling, and how to read intelligently its indications. In this the mariner has the advantage, and surpasses him; for the barometer has become indispensable to his profession as a mentor without whose company he would not dare to venture upon seas infested with cyclones. Sailors cannot at all times run within sight of shore to learn from the hoisted signal what is the matter; therefore, when in the open sea, they must depend upon their own resources for interpreting the reading of their instrument and attending phenomena, and there are few among them who cannot do this intelligently. As it is with the navigator, so it is with the farmer. As no system of signals can be devised and hoisted to serve any class of men at all times and at all places, so they necessarily must be more or less thrown upon their own resources, and work out their salvation with fear and trembling.

While we will never again be able to dispense with the services of the Signal Corps, we can not and must not depend upon it to do all our thinking; and to that end we must qualify ourselves to be independent of them as far as deductions are to be made and conclusions to be arrived at. Before the good times come to the farmer, when he need have no anxiety about the weather, he must be educated in the general principles of meteorological science.

The observations of the Signal Corps, and the indications of our own instruments, can at best only furnish us the elements of the problem to be solved. A preparatory training in the facts and elements of meteorology should be given to the rising generation, not only in our common schools but in our colleges.

True we have no such science as Meteorology to teach. What passes for such now is a misnomer, a mere incongruous mass of crude and conflicting hypotheses, that have as much resemblance to Meteorology as vegetable oysters have to real oysters. We are, however, not entirely ignorant in this branch of knowledge, for we know some facts, and are able to interpret tolerably well their meaning. If we stick to the facts, and let the speculations of theorizers severely alone, science will rapidly grow upon us. It must be confessed that Meteorology is a dark subject, but we will endeavor to let some light into it; not by new theories and speculations, but by presenting the most conspicuous facts, and then drawing a few general and far reaching deductions, which inevitably follow from these facts. These will give only an imperfect outline of the science, for time does not permit me to present it in its fullness, symmetry, beauty and simplicity.

It matters not who makes a prediction of the weather, be he ignorant or intelligent, if the prediction is analyzed, the fundamental element upon which it is based is always found to be the wind, its force and direction. Now who can tell what wind is? It will be answered: why, it is air in motion. True, but please tell me what put the air in motion? I well know what philosophy, falsely so called, says about the motive power, but neither I nor you are bound to renounce our individual judgment in deference to the dictum of philosophy, unless there is an array of facts, laws and causes, so presented as to make that dictum an irresistible inference or deduction, and consequently a self-evident truth.

The wind hypothesis of philosophy is any thing but a self-evident truth, and is contravened by so many facts that it is not even a legitimate deduction from the assumption itself. Philosophy says the causes of wind are the rotary motion of the earth on its axis, and local rarification of the air by heat. That is, wind is produced sometimes by one cause and sometimes by another. To this we demur; for if there is not a uniform relation between cause and effect, then the same effect may be owing to different causes. Consequently a knowledge of Nature's economy becomes an impossibility; since instead of our task being confined to tracing an effect to a single and uniform cause, which, when once understood will in all times and places stand as the sole and universal cause of a given effect, we would have an unlimited number of causes to trace up; hence certain and complete knowledge of the physical world would be unattainable.

We further demur to this hypothesis, because it implies a contradiction which makes it absurd, in this: that when air has passed the *calm* belts of the tropics it still out-travels the earth, because of the velocity acquired from the rotary motion of the earth while within the tropics. A calm is air without motion; yet this hypothesis assumes that air issuing out of a calm has the same motion it had before it became calm. O consistency, thou art a jewel!

Turning from the visionary and baseless speculations of theorists to nature herself, as the instructor, and interpreter of her own laws, what does she say? Didactically nothing; but smiling with radiant beauty,

she points to the facts written in characters of living light on the earth and on the sky. Who will dare say that we cannot read, decipher and interpret this record, when the fact stares us in the face that even those of humblest acquirements and capacity are constantly and intelligently, too, predicting a change in the weather, assigning as a reason therefor that the wind has changed. Not only so, but they predict the character of the change from the point from which the wind blows. Winds, therefore, are nature's harbingers, sent forth to announce an approaching change. Tell me how it could be possible for winds to be harbingers of changes, if they resulted from axial rotation of the earth, or from rarification of air on its surface. It is self-evident that these two ideas are incompatible; and as we know the changes of wind indicate changes of weather, we accept this proposition as true and let the artificial theory spun by speculating without facts, "slide" as worthless in our investigations. What, then, is the cause of wind?

We have an instrument which was first considered a philosophical toy; but its revelations soon became so extraordinary and startling that it gave rise to problems with many of which the mightiest intellects have grappled but failed in solving. It has not yet exhausted its lore, nor taught us half it is capable of doing; for year by year it is conducting us to higher and higher scientific standpoints. That instrument is the barometer; invented by Torricelli, of Florence, about two and a third centuries ago. Its name is derived from two Greek words *baros*, weight, and *metron*, measure. It therefore means a weight measurer. It is used to ascertain the weight of all gases under pressure; hence the weight of the atmosphere. It was soon discovered that the mercurial column at any given place, is subject to great fluctuations as to height, sinking below and rising above the general average of the place. Moreover, when the instrument was taken to a greater elevation, the mercurial column fell; when to a lower, it rose.

Hence the inference was drawn that the difference in the height of the mercurial column was due to the difference in atmospheric pressure at different times in the same places. After a while it was discovered that the barometer invariably fell on the approach of a rain, from two to three days in advance; that it continued falling until the storm had attained its maximum, when it would gradually rise. A cognate discovery was, that whenever there was a fall in the barometer there was a rise in the thermometer, and *vice versa*. Comparing its movements with physical facts it was discovered that the variations of the barometer had an intimate relation with the direction and force of the wind; hence the barometer came to be called "the weather glass," by the common people. The barometer had now led the way into the vestibule of the great temple of nature, and not only qualified man to comprehend the mysterious secrets of the department of Meteorology, but placed the key in his hand that unlocks them. Then it was seen for the first time that the wind always blew out from an area of high barometer into an area covered by a low barometer. Francis Galton, of England, made not only this important discovery, but also that the course of the wind is a winding spiral,

blowing out of an area covered by a high barometer, in a curvilinear motion, represented by a receding spiral; and into an area covered by a low barometer, by what is called a contracting spiral. The former winds were called anti-cyclonal; the latter cyclonal: both terms admirably express the facts of the phenomena.

Naturally when the human race is brought face to face with the fact that there is an out-blowing wind from an area of high barometer, the question suggests itself, whence comes the air to supply and sustain this continuous outflow? As the outflow is from all sides of the area, evidently the supply is not furnished laterally. Therefore, if man had not so much error to unlearn, which has been inculcated in the schools about wind, and which he has passively received as true, without investigation, and even without questioning—the truth would flash upon his mind, that the air supplying and air sustaining this continuous outflow must come from the zenith; for under the circumstances it cannot come from any other point. Since the air comes from above, a graphic representation of such a descending current is a whirlpool in the atmosphere—like the Mælstrom on the coast of Norway—over the central point of the area covered by a high barometer. Hence the atmosphere, instead of being piled up and deeper over such an area, as is generally supposed, is actually shallower; and the high barometer indicates the *pressure* of this descending column, and not the static *weight* of the atmospheric stratum. Since the winds blowing into an area of low barometer are cyclonal, and approach in contracting spirals toward the focal center of the area; therefore what becomes of that wind that not only blows inward toward the focal center, but intensifies its velocity inversely as the distance from the center? We again see that, to an unprejudiced mind, the conclusion is irresistible that the air, driven with such intense velocity to a common center, must ascend. The column of ascending smoke, seen in a calm over a large fire, vividly represents what is taking place over a storm center. Contrary, again, to popular opinion, the atmosphere instead of being depressed over such a center bulges up, and its stratum is deepest there. But if the stratum is thickest, how does it come that the barometer shows it has less weight? Upon the same principle that the descending column over an area of high pressure affects the barometer, but with the direction of motion reversed. In the ascending column, over an area of low pressure, the pressure is eased by the force propelling the ascending column. In neither the ascending nor descending current does the barometer indicate the weight of a static column of the superincumbent atmosphere, but the *pressure* to which it is subject.

We have now struck a warm and plain track of the winds, and with a little patience and preseverance will run them down. This track, the high and low barometers must lead us to their homes, and enable us to unravel the mystery of their apparently irreconcilable movements, so that where we now only see complication, confusion and discord, we will then see only order, simplicity, harmony and concord. Before we can, however, attain our object, we must do some preliminary work by arranging the order of our pursuit.

Observations made in all parts of the globe have established the fact that there are three species of both high and low barometers; namely, permanent, periodical and temporary. There are four permanent high barometers, located as follows: One in the North Atlantic, one in the South Atlantic, one in the South Pacific, and one in the North Pacific. To these may be added a fifth, a comparative high barometer in summer, of small dimensions, over Hudson's Bay. The oceanic high barometers swing considerably north and south, keeping within limits their relative position to the declination of the sun, and they are continually oscillating from east to west; for instance, that in the North Atlantic encroaches considerably at times upon the eastern portion of the American continent, and upon the western portions of both Europe and Africa.

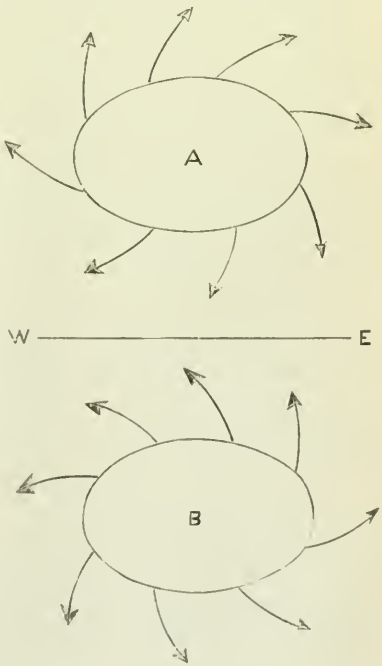
The permanent low barometers are five, located as follows: One around each pole of the earth, one on the equator, extending entirely around the globe, one over Iceland and southeastern Greenland, and one in the North Pacific ocean, covering the Aleutian Archipelago. It will thus be perceived that there are no high nor low permanent barometers excepting over the oceans. Continents give rise to the phenomena of periodical high and low barometers. They are called periodical, because in the winters of both hemispheres a high barometer occupies the centers of continents; and in their summers a low barometer prevails at those centers. That is, the periodical high and low barometers change places when the sun crosses the equator. Hence, in the interior of Asia, and north of the 45th parallel of north latitude, there is a low barometer in summer and a high one in winter; a low barometer central in the valley of the Sasgatchawan, in Monitoba, North America; and one in South Africa, from October to March—the summer months of the Southern Hemisphere. The one in South America is not so distinctly marked, on account of the narrowness of the continent there. The permanent high barometers have their centers or maximum pressure in both hemispheres between the 35th and 40th parallel. Their centers generally are marked by Sargasso seas; and their out-blowing winds cause that whirl in the oceans which gives rise to the great equatorial current, the gulf-stream on the east coast of North America, the Kuro Sivo on the east coast of Asia, and to the northern currents along the west coasts of both Europe and North America. The currents along the coasts of the southern continents obey the same law, but, as a matter of course, their directions are reversed, since the action of the motive force is reversed.

The average pressure of both permanent and periodical high barometers, at their centers, is 30.3 inches, excepting that of Hudson's Bay, which is about 30 inches. The average pressure of the low barometers, both permanent and periodical, is as follows: Equatorial, 29.9 inches; Iceland, 29.5 inches; Aleutian, 29.6 inches; Polar, unknown, probably 29.4 inches; North America, 29.6 inches; Asiatic, 29.5 inches, and South Africa, 29.6 inches. Periodical barometers disintegrate, and send off temporary high and low barometers, which, if not controlled in their movements by their opposites, take a direct course to the nearest *similar* permanent barometer; that is, a temporary low barometer to a permanent low one, and *vice versa*. The disintegrated parts of low, or temporary

low, barometers become *storm centers* which traverse the surface of the earth in an easterly direction. The temporary high barometers, if free, in North America, take a southeast course and join the permanent high barometer between the Bahama and Bermuda islands. Galton very appropriately named the winds blowing out from under an area of high barometer anti-cyclonal; since as they diverge from a common center on all sides in curves, they never can produce cyclones. He has appropriately called those blowing into an area of low pressure cylonal, since converging to a common center they must inevitably produce cyclones, of more or less energy.

We have said that both the out-blowing and in-blowing winds have a curvilinear motion. Therefore, in order to know and to explain the direction of the wind, under given conditions of pressure, we must know the direction of these curves. Take any two points, A and B, for instance. From the point A as a center draw curves from the center outwards to the right, thus ↗; and from B as a center draw curves to the left outwards, thus ↙. Then A will represent the direction of both cyclonal and anti-cyclonal winds in the Northern Hemisphere; and B those of the Southern Hemisphere. It will be perceived that the direction of the anti-cyclonal winds in the Northern Hemisphere is direct, that is, they have the same direction as the hands of a watch, and the cyclonal ones retrograde, that is, contrary to the hands of a watch; and that in the Southern Hemisphere these movements are reversed.

Now let the line E.W. represent the equator between South America and Africa, and the oblong ellipse A the area covered by the permanent high barometer in the Atlantic, north of the equator; and the ellipse B the permanent high barometer in the Atlantic, south of the equator; then the arrows on the nearer sides show the direction the wind blows into the permanent low barometer along the equator E. W. The wind on the north side is seen to be from the northeast, and that on the south side from the southeast; in other words, you have before you the laws and causes of the northeast and southeast Trade Winds.



Take another illustration. I have already stated that in the summer, that is, from the time the sun crosses the equator, in his northern journey, until he again retires beyond it, there is a periodical low barometer in Central Asia; while at the same time, it being winter in the Southern Hemisphere, there is a high barometer in

South Africa. This is the position of these periodical barometers from the first of April to the first of October; but from the first of October to the first of April, the relative position of these high and low barometers is reversed; that is, the high barometer is in Central Asia, and the low in South Africa. Now, according to the principles advanced, there should be from April to October a wind blowing from South Africa to Central Asia, and from October to April from Central Asia to Africa.

If you examine your books, you will find that in Hindostan and on the Indian ocean, intermediate between these two points, the southwest monsoon blows from April to October, and the northwest from October to April. You again have before you an illustration of the laws and causes of winds, as exemplified in the northeast and southwest monsoons.

The same principle, when applied to either permanent, periodical, temporary or variable winds, is found to be universally true. By taking the daily observations of the Signal Service Bureau, you can verify the principle for every day in the year.

The cause of winds and the laws of their movements are so plain and simple that a child of ordinary capacity, still on the sunny side of the "teens," can not only comprehend them, but apply them so as to show the direction of the wind from any given statement of the readings of the barometer.

All fair and candid minds, not preoccupied by the phantastic hypotheses of the dead past, will admit that the exegesis of the winds here given is so plain, simple and lucid, as to be almost, if not quite, a self-evident truth. All I ask is a rigid scrutiny of facts and a vigorous test of its principles; and then I will have no fear that the public verdict will not be, *the barometer tells us all about the winds.*

I have already stated that the barometer has not taught us half that it is capable of doing. I will not trespass upon your patience by proving what I hold to be the exciting cause of high and low atmospheric pressure, or high and low barometers, as they are generally called. I am convinced the cause is electricity; and therefore that the descending current of air over an area of high barometer, and the ascending current over an area of low barometer are electric currents. Balfour Stewart said something to this effect, that the test of a theory is not so much by the facts it explains, as by the new facts it discovers by suggesting them.

In my investigations, I make it a rule never to accept any theory as true, whether projected by myself or others, until it has stood the test, not only of the whole class of facts it was intended to explain, but all the facts that necessarily appear and fall into line if the theory be true.

When I first commenced the study of high and low barometers, I had a notion that a high and low barometer had a natural tendency to coalesce and obliterate each other. Comparing this notion with the idea that they were electric currents, I clearly saw that the two ideas were incompatible, since the law of reciprocal action—as discovered by Ampere—between parallel electric currents, is, that if they flow in the same direction they attract, but if in opposite directions they repel each other. It hence follows that either high and low barometers do not coalesce,

or if they do, they are not electric currents; and conversely, if they are electric currents, then similar barometers must attract and coalesce with similar, and repel dissimilar. In other words, a high barometer must attract a high barometer, and a low barometer a low; but a high and a low must repel each other.

About three months ago the "Weather Maps" for the month of August, published by the War Department, and which they kindly send me, came to hand. In these maps, for the *first* and *only* time, the tracks of *both* the high and low barometers over the continent are laid down, and their movements delineated for that month. This gave me the long-desired opportunity for determining the electric character of atmospheric pressure. It was an indescribable pleasure and delight to find the facts to be exactly as the theory suggested they must be, namely, similar barometers attracting, and dissimilar repelling, each other.

I intended to present with this paper copies of the series of maps by which the theory was first verified by me, but I could not spare the originals, and had not time to make copies. But any one can make the verification who has the War Department Weather Maps for Aug. 1873. Take any outline map of North America, and copy on it, from Map No. 2, the focal points of low barometers, or centers of storms, Nos. 3, 4, and 5, with the date and time of observation. Copy similarly the focal center of high barometer No. 1, from Map No. 4; then from the synchronous observations of both high and low barometers, by drawing straight lines between them. Take similar outline maps, and draw successively all the synchronous high and low barometers. Nos. 2 and 3 of high barometer are evidently the same barometer. No. 2, passing beyond observation on the 18th, west of Newfoundland, it swept by a curve west through Labrador, and reappeared on the 20th in the lower valley of the Ottawa, Ontario, as No. 3. High barometers Nos. 4 and 5, evidently, are also one and the same. No. 4 passed from observation in Labrador, August 25th, swept around north, and reappeared as No. 5, August 26th, north of Lake Superior. Draw a curve to represent the probable track of both while beyond observation.

Nos. 8 and 9 of low barometers are evidently the same, No. 8 sweeping around beyond observation in northwestern Manitoba. When these maps, so drawn, are compared, the conviction is irresistibly forced upon us, from even a superficial examination, of the truth of the theory. For instance, the position of the high barometer and its repulsive force were so effective, in two instances, that it drove the low barometer back to its source, making it describe an ellipse.

The terrible hurricane of August 23d, 24th and 25th, also drove back the high barometer No 4 toward its source. The track of this hurricane, driven like a wedge between the Atlantic high barometer and the Canadian, shows not only how its movement was retarded by this resistance, but plainly indicates the cause of its terrific energy. The Florida hurricane of the 3rd to the 6th of October shows the same phenomena under similar circumstances.

Before closing, I will give a few essential points determining the causes and disclosing the laws of the movements of storm centers. We have already stated that a low barometer attracts a low barometer, and that the wandering, temporary low barometers are attracted to and absorbed by the fixed, permanent low barometers. For the North American continent, the controlling barometer is the fixed low barometer around Iceland and southeast Greenland. All the temporary and wandering low barometers on the American continent, that are free, will therefore pass to it in a straight line.

For instance, see the movements of the tropical storms that burst from the south on the Gulf States. They follow the coast of the Atlantic in a direct line to Iceland. The continental storm centers generally originate in Manitoba, consequently they would proceed in a straight line to the southern point of Greenland, were it not for the high barometer over Hudson's Bay, which repels them southeast into the upper valley of the Missouri, whence they sweep around the Hudson's Bay region with a graceful curve, over or along the southern shores of the great lakes, down the valley of the St. Lawrence towards Iceland. Low barometers are flanked by two high barometers, between which they are driven as a wedge, move slowly, and develop intense cyclonal energy. For examples, see the disastrous cyclone of Nova Scotia, in August, and that of Florida, in October, already mentioned.

Here opens a wide field for investigation and discussion, upon which we cannot enter for the present.

The Society adjourned until nine o'clock to-morrow morning.

THIRD DAY.

MORNING SESSION.

The Society met at nine o'clock—President M. L. Dunlap in the chair.

The meeting was opened with prayer by Suel Foster, of Iowa.

ELECTION OF OFFICERS FOR THE ENSUING YEAR.

Mr. Scofield moved that the rules be suspended, and that a committee of five be appointed on nominations.

This was objected to by Messrs. Minkler, Flagg and Nelson, and consequently the election was proceeded with in the usual manner, viz., by

ballot, when two or more persons are put in nomination for the same office ; otherwise by voice.

Mr. SCOFIELD nominated ROBERT DOUGLAS, Esq., of Waukegan, as President.

The nomination was concurred in, and Mr. Douglas was unanimously elected.

VICE-PRESIDENTS.

The following gentlemen were elected Vice-Presidents:

S. G. Minkler	1st district.
A. R. Whitney	2nd "
A. C. Hammond	3rd "
L. C. Francis	4th "
B. Pullen	5th "
Isaac Snedecker	6th "
T. A. E. Holcomb	7th "

On motion, O. B. Galusha was unanimously re-elected as Secretary, H. J. Dunlap as Assistant Secretary, and Jona. Huggins as Treasurer.

LOCATION OF NEXT ANNUAL MEETING.

Mr. BUTTERWORTH presented a verbal invitation from the Adams County Horticultural Society, and nominated the city of Quincy.

Mr. BOURLAND nominated the city of Peoria.

After a brief conversation upon the relative merits of the two cities, a rising vote was taken, resulting in fourteen votes for Quincy, and twenty-six votes for Peoria, whereupon the latter city was declared as the place of next annual meeting.

HONORARY MEMBERS.

On motion of Mr. Daggy, the following gentlemen were elected honorary members of the Society for the year 1874:

Dr. John A. Warder	Cleves, Ohio.
Prof. J. H. Tice	St. Louis, Mo.
Prof. C. V. Riley	St. Louis, Mo.
Hon. Suel Foster	Des Moines, Iowa.
J. H. Nicholson	Brideport, Ind.
Dr. Allen Furness	Danville, Ind.
Dr. Wm. Le Baron, State Entomologist	Geneva, Ill.

AMERICAN POMOLOGICAL SOCIETY.

MR. FLAGG offered the following resolution:

WHEREAS, The American Pomological Society has voted conditionally to hold its next biennial meeting at Chicago; and

WHEREAS, There has been no formal invitation extended to them to do so, through fortuitous circumstances; therefore,

Resolved, That this Society will welcome the American Pomological Society to this State, and will use their best efforts to secure a proper place of meeting, an exhibition of fruits, and to make the meeting a success.

SECRETARY GALUSHA stated that he telegraphed Messrs. P. Barry and F. R. Elliott, (Secretary,) at the late meeting in Boston, inviting the American Pomological Society to hold its next meeting in Chicago.

MR. FLAGG—I seems this telegram failed to reach them.

The resolution was adopted.

DELEGATES TO OTHER SOCIETIES.

On motion, the following gentlemen were designated a delegation to attend the annual meeting of the Iowa Horticultural Society:

T. McWhorter, Dr. A. G. Humphrey, D. B. Wier, A. C. Hammond, H. J. Dunlap.

Also, the following gentlemen to attend the annual meeting of the Indiana State Horticultural Society, commencing January 6th, 1874:

Tyra Montgomery, W. T. Nelson, M. L. Dunlap, Mercer Brown, B. O. Curtis.

Also, the following gentlemen to attend the annual meeting of the Wisconsin State Horticultural Society, on the second Wednesday in January, 1874:

L. K. Scofield, Robert Douglas, D. B. Wier, Isaac Baldwin, H. C. Graves.

Also, the following gentlemen to attend the annual meeting of the Missouri State Horticultural Society:

T. Butterworth, W. C. Flagg, J. Huggins, H. D. Emery, John Stewart.

MR. FLAGG offered the following, as President of the Illinois Farmers' Association:

CHAMPAIGN, Dec. 10, 1873.

HON. M. L. DUNLAP, *President Illinois State Horticultural Society:*

DEAR SIR—The Illinois State Farmers' Association meets at Decatur next week, December 16th–18th, and I would hereby tender an invitation to the Illinois State

Horticultural Society to attend by delegates or otherwise. The meeting promises to be a large and interesting one, and will be addressed by Prof. J. B. Turner and others.

Truly yours,

W. C. FLAGG,

President Illinois State Farmers' Association.

Mr. GREENE moved that two delegates be appointed from this Society in response to the invitation, which was concurred in, and

C. W. Greene and H. D. Emery were appointed as such delegation.

SYSTEM OF CROP REPORTS.

MR. GREENE, having obtained leave, addressed the Society as follows:

The subject I wish to present is the establishment of a system of crop reports, which we have recently undertaken, making the headquarters at Jacksonville, in this State. I first proposed it from Jackson, Tennessee, but I found it was too far from the centre of crop location, and some three months since we first commenced the issue of our reports.

These reports contemplate the issue, by counties, of the crop reports of the United States, not only giving the aggregates, but giving the local data, so that the information may be verified, as well as be of local benefit. What I propose giving in these reports, is the information given us, so as to be of actual benefit to you. The horticultural products are recorded in separate tables, during the time of their production. The information is given twice per month, and as fast as received. You will see that every one of you is interested more than any individual publisher can be. The work is one that must be done by co-operation. I cannot do it alone, and I have only undertaken it because I am officially connected with the National Agricultural Congress, and, at the same time, it is the universal desire of the American community that such a system be established. I have undertaken the matter, but must get the co-operation of many men in all the different industrial societies. We have at present over one hundred correspondents, and there are some here whose assistance I value very highly. I do not present this as a matter to benefit me, for it is a work of years; but I want you to comprehend the character of these reports, and to see the immense practical value they may be to each one of you, if you will assist in the counties where you have interest; if you will assist us in getting a good reporter in these districts, and then get each of your local papers to publish the crop reports. You have just as much interest in seeing this work done right as we have. You have an interest in assisting us to verify and correct these reports.

The support at present is very much from the mercantile classes ; and, to my surprise, I see they are as willing and desirous to get crop reports from the agricultural authorities, as we can be to give them to them.

I claim no originality in this ; it is simply to carry out the views of Commodore Maury, who presented them at St. Louis, at Memphis, and in New England, and I think they were endorsed by this Society last year. I was assisting him up to the time of his death, and it is pursuance of that plan, and because it was refused all action on the part of the Agricultural Bureau at Washington, that I have undertaken it in this way.

I will say that although we have only issued six numbers, it is already received as the most authoritative publication yet made, by the best mercantile establishments in the country. You are interested in supporting this system, not because it is a system, but because it is money in your pockets. If you see fit to endorse it, I shall be glad.

Mr. Galusha—I move that we heartily indorse the plan proposed by Mr. Greene, and pledge ourselves to use all reasonable efforts in aiding the consummation of the plan.

I regard it as one of the best plans that has ever been devised to prevent undue fluctuation in prices of agricultural and horticultural products ; the great drawback to profitable farming and fruit-growing is now and has been the uncertainty—want of knowledge—of the amount of crops or stock, growing and on hand. Let these be known, then knowing the average demand or annual consumption, all intelligent cultivators will know, within a small margin, what their products are worth in the market. If such statistics are collected from the most reliable sources, and published, with statistics of amounts of average consumption, it will help us every month in the year and put money in our pockets. I regard it as a very important plan, and I think it deserves our cordial co-operation. The more we think about it the more we shall appreciate it.

Mr. Galusha's motion was then put to vote, and adopted unanimously.

Mr. Riley presented the following preambles and resolutions, moving their adoption :

Whereas, Most just complaint is being made against the present head of the Department of Agriculture at Washington ; and

Whereas, There is evident need of expansion and reorganization of said Department, to make it more subservient of the great national interest for which it was established ; therefore,

Resolved, That it is the unanimous opinion of the Illinois State Horticultural Society that a change should be made, and that the present Commissioner of Agriculture should be replaced by some more capable person, who understands the needs and

wants of Agriculturists and Horticulturists of the country, and especially of the Great West.

Resolved, That the Corresponding Secretary transmit a copy of these resolutions to the Secretary of the Interior, and to the President of the United States.

REPORT OF VICE-PRESIDENT FOR THE SIXTH DISTRICT.

Isaac Snedecker, Vice-President for the Sixth District, next read his report, which was as follows:

Mr. President and Members of the State Horticultural Society:

We are once more in council, for the purpose of exchanging views and giving encouragement in the great work of our profession, by telling the means and methods of our successes, as well as how we have combated the adversities and discouragements that have arisen in our way—our insect enemies, the frosts of winter, the droughts of summer, the atmospheric influences and continual changes that surround us. All these call forth the energies and talents of the most learned and scientific, as well as the most practical, industrious and laborious of the whole family of man.

As will be observed by looking at the map of the State, Jersey county is one of the most northern counties of the Sixth Horticultural District.

The extreme lowest temperature here, last winter, was 36° below zero, and it is well known that trees, shrubs and vines cannot stand that temperature for a great length of time. Fortunately, the duration of extreme cold was short, yet long enough to cause serious disaster.

It is suggested by Mr. Flagg, of Madison county, that the great drought of the last three years had such an effect upon our trees, etc., that they were not in a condition to endure so great cold as they otherwise would have done. Yet the trees were not so generally damaged as to destroy entirely their fruitfulness; and by dint of selecting specimens here and there over the county, there was enough fruit collected at our county fair to make quite a fine display of apples, pears and quinces.

Peach trees of ten years and older were mostly killed. Quince trees also were quite generally killed.

A large portion of shrubbery was killed to the ground, but has sprouted up again.

Much has been said in favor of adjacent or surrounding groves, or belts of timber, and I have no doubt they are in the main beneficial; yet we must not place entire confidence in them, for it sometimes happens that orchards most exposed show most fruit. One orchard in my own vicinity, containing five or six acres, out upon the prairie, with no timber for miles around, except a five-acre plantation a mile away, bore this year the best crop of fair fruit of any orchard I have seen. Some trees in the orchard died, to be sure, but not more than in the average orchards.

My attention has also been called to a vineyard of Concord vines, planted on level land which was cleared of oak timber fifteen years ago,

and now has no timber protection, except upon the east side, which is not considered as producing any perceptible influence. This vineyard produced a good crop of well-ripened grapes.

Another apple orchard of twenty acres, in the county, bore a good half crop of fine fruit, yet it had no protection whatever.

I am not prepared to say that timber land is better for orchard purposes then prairie, as I have cultivated orchard trees in Jersey county about thirty years, both in deep, black prairie soil, and in the gray soil of timber lands, with rolling surface, and with no very marked difference in success. Dry, well-drained soil is always a requisite of success.

The gray soil would not commonly give so great a growth, but this deficiency I have been able to make up by cultivation and mulching. Our experience is that trees in grass will do as well as those in cultivation, *if well mulched* in the spring.

As our correspondent in Greene county fails to report, I will say that Greene is a very large, well cultivated and productive county, on the north of Jersey, producing just about enough fruit for its own consumption. The orchards of this county being small and separated from each other, are probably less tronbled with insects than the larger orchards, though the damage to the trees by the last winter was very severe.

I subjoin the following reports from the counties of Washington, Bond, Calhoun, Macoupin, Clinton, Randolph and Madison :

WASHINGTON COUNTY.

" In response to the circular of the Secretary of the Society, I have to report that the progress of Horticulture in the county of Washington was seriously checked by the unusual severity of the past winter. Its condition was indeed unsatisfactory enough a year ago, by reason of the very low prices obtained for most horticultural products, together with the heavy expense attending their shipment and sale.

" The past summer has been one of much toil with but little present profit, and no very flattering prospect for the future.

"As to a supply of fruits, failure has been the rule—very few persons having been able to supply their own wants.

" I have to remark that the low temperature of last winter resulted in the destruction of most of the fruit buds of nearly all kinds of fruit trees, or if not killed outright, they had but a feeble and sickly existence.

"As to the trees themselves, *Apple*, *Cherry* and *Pear* do not appear, in the main, to be seriously damaged.

" *Peach* trees fared worse ; most of the old trees—say from six to ten years—were killed, while younger orchards *where they have been well cultivated the present season*, and properly cut back, have shown a vigor of growth scarcely to have been expected. Neglected Peach trees, of any age, have mostly died.

" *Quinces*, also, have suffered severely; a very large percentage of the bushes having been killed or badly damaged.

" *Grape* vines of all sorts fared no better; even Concord and Ives' Seedling were found to be in nearly the same condition as Catawba and other sorts supposed to be less hardy. But very few pounds of grapes were produced in the whole county.

" I have not observed that adjacent or surrounding groves or belts of timber have changed the general result.

" Very little can be said in regard to modes of cultivation; almost every man is a law unto himself in this particular; the ordinary and cheap methods being chiefly in order as the result of small profits and almost smaller expectations; nevertheless, the

horticulturists of Washington county are not wholly discouraged. Many of our energetic and persevering ones are steadily at work, determined to learn lessons of wisdom from the adverse experience of the past, and in the future to deserve success, even if they do not secure it.

"The question of cheap and certain transportation, fidelity and promptness of commission men, character, cost and quality, packages, etc., are all more or less intelligently discussed by our people, and the hope is entertained that in the near future justice will be more nearly done to the grower, by those who carry and sell our products.

"RICHVIEW, ILL." G. WILGUS."

BOND COUNTY.

"This county has shared the general damaging effect of last winter's cold, though, perhaps, in a less degree than many others. Some Apple trees in orchards, especially Rambo, have been injured.

"My orchard is on the south side of a belt of different sorts of timber—Pin-Oak and other kinds—and I think the timber is of great benefit to the orchard.

"My Grape vines, Blackberries and other small fruits, were nearly all killed; also a portion of my Peach trees.

"*Planting.*—I prefer fall-planting of Apples and Pears as a general rule, though the best success I ever had was in planting on the 12th of May—the ground and season being favorable.

"*Cultivation.*—The usual mode of cultivating orchards here is to cultivate with corn for several years; afterwards plow them occasionally. I think, however, that an orchard may be injured by too much cultivation.

"*High or Low Heads.*—There is much said respecting low heads *versus* long stems, and on this topic I will relate my own experience. I have trees branching five feet from the ground, and others not more than two feet. While I can see no difference in the quality of the fruit, there is a great difference in the time and labor necessary to gather the fruit; and further, while the low-headed trees are free from sun-scald the tall bodies are injured by it; I therefore prefer low-headed trees. My oldest trees are twelve years old from planting.

"*Gathering and Keeping.*—My best success in gathering and preserving Apples has been to pick carefully by hand, pile in an out-building till cold, freezing weather, then put in barrels in which lime had been kept, and put in the cellar. In this way I have kept 'Bellflowers and Rambos into May.'

"E. GASKINS."

CALHOUN COUNTY.

"Horticulture has been much neglected in this part of the country, though gradually gaining ground for the last few years, several parties having engaged quite extensively in the cultivation of Apple orchards, some of which contain several hundred acres. Peaches and Pears have been cultivated also, for market, with success.

"The principal impediment to profitable fruit culture is the extreme cold of some of our winters, like that of last winter, which killed some trees entirely, and others so much weakened as to check their growth, and render them subject to diseases and attacks of insect enemies. I have noticed, during the last two years, many trees which began to die at the extremities of some of the branches, gradually dying down to the bodies; and when decay reached the trunks the whole went into decay.

"My plan to produce a healthy growth in Apple trees is to mulch when young, and give no other cultivation. Plant trees on a northern exposure, mulch, prune when necessary, and leave nature to do the rest. Pears and Peaches, however, seem to have a different nature, and require protection; the mulching process will not do for them, as it produces decay.

"It is contended by some of our fruitists 'that we will have to go back to first principles' in fruit-raising—growing natural fruit—as we had no trouble to grow good crops thirty or forty years ago, when all our Apple trees were seedlings.

"I am not prepared to recommend this plan, though in our attempt to improve the quality of our fruit we may have sacrificed the hardiness of the tree to some extent.

"The small fruits, as Blackberries, Strawberries, Currants, etc., generally do well here, but they require care to make them profitable. The native Blackberries, which used to be so plenty in this county, are almost extinct, having retired before the march of cultivation, but to give place to much better varieties.

"R. G. ANDREWS.

"NEWS P. O."

MACOUPIN COUNTY.

"Macoupin has had a hard time the past season—speaking after the manner of fruit men; still Macoupin is not dead, nor yet asleep, and in the future as in the past, will be known by her 'fruits.' No Peaches, no crop of Cherries, no Plums, Apples not a fourth of a crop, taking the county over; and yet, we find some orchards bearing a full or nearly full crop. Our trees generally showed a full bloom, but owing, as we think, in part to cold rains and frost during the period of inflorescence, the fruit did not set well; the dry and hot summer of last year we think was highly unfavorable to our trees, leaving many of them in a weakened condition. The excessive cold of last winter injured, as we believe, many trees, some of which have died, while others are in a sickly condition. Yet the most of our Apple trees have made a fair growth this year, are well set with blossom buds, and if Providence smiles, we shall have a good crop in 1874. Late bloomers, as the Janet, we find bore a full crop generally; though our apples were badly stung by the plum curculio and the plum gouger, rendering them very imperfect, and to a large extent unfit for market. These have been generally made into cider, and at Woodburn far more good cider has been made than usual, while at Brighton, Mr. Hilliard makes about one-third his usual quantity, and some cider mills there have done nothing. I am making about four hundred barrels for myself and neighbors. Bunker Hill is also making some cider.

"We find those orchards that have been for years pastured with hogs giving the best crops of fruit, and most free from insects. As these curculios that trouble us this year do not increase rapidly when compelled to drop their eggs in the Apple, we expect our crop of Apples next season will be free from their marks, especially should we have a crop of Plums, Peaches and Cherries, which they greatly prefer to use—Nature teaching them that these fruits make a congenial home for the young Turk and gouger, while their eggs do not, when dropped in the Apple, generally come to maturity. Our trees of all kinds have made a moderate growth, and we believe, having had a rest this year, will, with good care, produce a fair crop of fair fruit next year, and that growers will realize fair profits from the same.

"*Grapes* were also a failure, but the vines are in good condition.

"Our exhibition of fruits at our county fair was good for the season. Some who attended ours, state that it was equal in this respect to that of the State fair.

"We have several green-houses at different points in the county, all of which have done a good business this season, showing that while our people feel in common with the people of the State and country at large the 'hard times,' yet they have a love for the beautiful, and regard flowers as essential to make a pleasant, beautiful home.

"Our people are yearly being educated horticulturally, as is evidenced by the better kept orchards, and increased knowledge of fruits and fruit culture; the improvement of our door yards in neat appearance; the planting of trees in the streets and after care of them; and may we not add in the interest taken annually in the doings of our State Horticultural Society, as is evidenced by the large list of annual members from this county.

"Trusting in the Good Ruler over all things, we look forward, and over into the year 1874 with faith, and believe the good time is just there, and that we who go forward perseveringly will, with intelligent culture, overcome our insect enemies, and may reasonably expect paying crops of the luscious and health-giving fruits.

"WOODBURN." JONA. HUGGINS."

Mr. H. C. Clark, writing from Brighton, after giving in the usual testimony in respect to the damaging effects of the extremes of weather, says:

"Second—I do not believe that surrounding groves or belts of timber are any advantage to orchards, only in case of heavy wind storms or tornados. As far as my observation goes, the orchards on the prairies, without any wind-breaks, bear better and finer fruit than those surrounded by wind-breaks; they have the advantage through the growing and fruiting season of more light and air than those fenced in with groves. I think that is the reason they produce finer and better flavored fruit.

"Third—In the cultivation of orchards I would recommend the free use of the plow for the first four or five years. You may raise corn, potatoes and many other vegetables without any particular damage to the trees; then sow to clover and turn in hogs, poultry, young calves and any kind of stock that will not hurt the trees. Some would object to the hog's snout, but if he is reasonable in his work, all right; I want some rooting done; but if he should be too industrious, apply the ring to the nose. I have kept hogs in my orchards for five years with very satisfactory results; they are sure to consume all the windfall or wormy fruit as fast as it falls from the trees, and I believe a sufficient quantity of hogs in an orchard to consume the waste fruit will do more to destroy the insects that prey on our fruit than all the modes of warfare the entomologist can devise; besides there is economy in it, as the hog will grow and fatten on the waste fruit; you will seldom if ever find hogs, that run in an orchard, with any disease.

"Fourth—In regard to planting *Apple* trees, I would plant thirty-two feet apart; nothing less; would dig holes large enough to receive the roots without cramping or breaking them; would plant early in the spring; but if planted in the fall would be sure to mulch well to protect from the severe frost. I do not believe in trimming much; when setting it may be necessary sometimes to thin the top a little, but never cut back, as in so doing you increase the foliage ten-fold.

"*Varieties.*—This is a hard question to solve, as some varieties will do well some years, and then not so well. For instance, at one time the Red June was considered worthless; it is now one among the best of all our early varieties—probably the most profitable of any. The Large Romanite (Pennock) was once discarded from the nurseries; it now stands next to the Yellow Bellflower in the market as a selling Apple, and is much more profitable than the Bellflower, as it is a better bearer. I believe the Winesap stands at the head of our list as a winter Apple; the Janet bears well, the Roman Stem, Pennsylvania Red Streak, Rambo, and Fall Wine do well; Smith's Cider is a good Apple, and the tree a good bearer. The Little Red Romanite is always on hand—a pretty good Apple after the others are gone. There are a number of other varieties that do well some seasons, but these mentioned are probably the most profitable.

"As far as *Pears* are concerned, they have never been found to be very profitable; so subject to blight, that people feel a delicacy in setting them; an occasional Pear tree pays well.

"The majority of our *Peach* orchards are gone by the board, and there does not seem much disposition to set new ones; but I believe it would be a good idea to set now. We have had quite a number of good crops of Peaches in this neighborhood.

"*Gathering and Keeping Apples.*—Gather and pile on the ground in the orchard, and cover with straw; leave them there as long as it is safe on account of frost; a slight frost will not hurt them if not handled while frozen. Then barrel in tight barrels, and place in a dark, cool cellar."

MADISON COUNTY.

"In pursuance of my duties as correspondent for the county of Madison, I respectfully report that my opportunities of seeing many parts of the county this year have been limited, and that I report from what I have seen without quite knowing that what I have observed can be corroborated by the observations of others. You will yourself be able

to judge of the correctness of my opinions as applied to many parts of the county. Taking up the topics suggested by our Secretary in their order:

"FIRST—'The effects of the past winter upon trees, shrubs and vines': I should amend this heading so as to read: 'The cumulative effect of the extremes of heat and drought in 1870, 1871 and 1872, supplemented by the extreme cold of January, 1873.' I do not think our trees would have been much injured, even by the severe cold of last January, which was the coldest on record in our county, had they not been, as a rule, in an enfeebled condition from excessive bearing and inadequate moisture in 1872, which excessive bearing was itself the result of the excessive fruit bud development of 1871, caused again by prolonged drought and insufficiency of growth. The effects of these two or three seasons, as I regard it, have been disastrous and to many discouraging.

"*Apple* trees, where old and enfeebled, have died outright in considerable numbers. I have a great many Rawles' Janet trees, of thirty years' growth, that are now chiefly valuable for firewood. Newtown Pippins, planted the same year, bore more apples than any other variety I have, whether young or old. Young and apparently vigorous trees, of many varieties, either showed no bloom or failed to set fruit when they did. The variety that I have noticed as most injured in young trees is Fallawater. The foliage on all Apple trees this year has seemed sickly, and the growth has been small unless under special cultivation or in rich soils. In the American Bottom I have seen some orchards pretty full of fruit. In nearly all cases the fruit has been attacked by an immense number of insect enemies, that were grown in great quantities last year, and found but little on which to spend their energies this year. The curculio, codling moth, and another insect which I have not before seen much of, and whose habit answers somewhat to the description of the apple maggot, were noticeably the worst.

"*Pear* trees, when of some age, escaped the worst influences of drought, apparently, which I attribute to their deeper rooting. Several of my old trees, whilst younger trees of the same variety were quite bare, bore good crops of tolerable, though not first rate, fruit. Blight has not appeared to any great extent.

"*Peach* trees of ten or twelve years of age, that bore heavy crops of fruit in 1872, are generally dead or so far gone as to be not worth saving. But younger trees, especially when cultivated, although injured, give promise of recovery and future usefulness.

"*Apricot* trees, planted in 1862, seem less injured than Peach trees. No fruit.

"*Cherry* trees were badly injured in many cases and bore no fruit worth mentioning.

"In all cases that I have noticed, good cultivation in 1872, or its equivalent in richness of soil or manure, had the effect to counteract, to a greater or less extent, the effects of drought.

"*Forest* trees, that by accident were grown in places where their roots could not strike deeply, or that were otherwise enfeebled, seemed to die more than usual.

"Of *small fruits* the Kittatinny Blackberry wintered pretty well and bore some fruit, under poor cultivation. The Lawton bore no fruit; in fact, the canes were nearly all killed. Purple Cane and the Doolittle and Miami Black Cap Raspberries were hardy, but the Philadelphia not so much so. Strawberries gave only a small crop.

"As a rule, every thing gave evidence of exhausted vitality; shown in death, feeble growth, dropping of bloom, paleness and lack of color in the blossom in flowering plants, and in the dropping and late maturing of fruit. The Newtown Pippin, which in most seasons is ready to fall from the tree inconveniently early—by the middle of September—was hard to gather, from its persistence this year, nearly a month later.

"SECOND—'The influence of adjacent or surrounding groves or belts of timber upon orchards or vineyards,' I have not observed to have any effect whatever during the year just past. I believe it is in some years beneficial and in others injurious, in this latitude.

"I have nothing new to offer on the other topics.

"MORO, ILL." W. C. FLAGG."

RANDOLPH COUNTY.

"The extreme changes of temperature last winter and spring destroyed the fruit buds of the *Peach* trees in this section, and where budded trees were not sheltered by timber, injured the trees to some extent.

"*Apples* and *Grapes* were also injuriously affected, except in a few favorable situations. The crop of Apples was small and very imperfect in exposed orchards, while orchards on hilly, timbered ground yielded the best and most perfect fruit.

"*Grape* vines yielded scarcely half a crop on an average—sheltered vines yielded the most fruit.

"*Gooseberries* and *Currants* yielded nearly an average crop, but *Blackberries* were almost an entire failure, both wild and cultivated, and the same may be said of *Strawberries*.

"*Apple* trees seem not to have been injured. The only fruit tree injured to any extent was the *Peach*.

"The *Pear*, *Cherry* and other trees, escaped injury, but the yield of Cherries was small and very imperfect. The curculio had no Peaches to work on, and selected the Cherry as a substitute.

"*Shrubbery* sustained no material injury, except, perhaps, in a few exposed situations.

"In this section the influence of groves and protecting belts of timber upon orchards and vineyards is decidedly beneficial. Our most severe degrees of cold, during even ordinary winters, are often accompanied by violent northwest and north winds, producing sudden great changes in temperature. Large groves and thickly wooded belts of timber, on the northwest and north sides of orchards and vineyards, protect them very greatly and are beneficial.

"The plow may be said to be the only implement used in this section to cultivate orchards and vineyards. Other methods are not practiced to any great extent. Judicious plowing every season seems to benefit vineyards. Manure is not much used. Orchards seem to do best in grass, if kept well pruned, and plowed once in two or three years.

"All varieties of fruit trees, planted in locations where there is sufficient drainage, do well in this section in ordinary seasons. Long continued droughts in summer and fall, short spells of extreme cold in winter, and late frosts in spring, seem to be much more prevalent now than twenty-five or thirty years ago, and affect all fruit trees injuriously—some kind more than others—budded Peaches more than seedlings.

"FRED. E. DETRICH."

CLINTON COUNTY.

"The effects of the last winter upon all kinds of trees and plants were, and are, most disastrous. Most of the old *Peach* trees, and *all* that were heavily loaded with fruit the previous summer, are dead, or nearly so.

"Many *Apple* trees that were not entirely killed, were so weakened as to simply put forth leaves and maintain them through the year, without making any growth whatever.

"Nearly all of the more tender *Cherry* trees are killed. Even the Early Richmond, in many instances, was killed, especially where it was on the Mahaleb stock. The trees on Morello stocks were hardier, especially when budded low down.

"The small fruits did not escape the general destruction.

"*Raspberries* and *Blackberries* were killed down to the snow line, and have made but little over half the growth this year they did last. Even the Kittatinny Blackberry was badly killed; so we had no crop.

"*Strawberries* were much weakened—crop about one-fourth as much us usual. The lowest temperature was 30° below zero.

"The summer of 1872 was so very dry as to leave all kinds of trees and plants with a very low grade of vitality. This, I think, may account for much of the damage done by the cold of winter.

"I don't think shelter belts or forests did any good or harm in this region.

"Some orchards had been well cultivated with plow and harrow, and others were entirely neglected, with the same results, as far as the winter is concerned.

"Spring planting, as early as possible, is the only time, in my opinion, for all kinds of plants in this region of country. There has been no thorough culture in this region yet, so far as depth is concerned, and consequently our terrible droughts have been master of the situation. When we can cultivate two feet deep, and keep the ground thoroughly pulverized, we may defy dry weather, and not before.

"M. M. HOOTON."

The above comprise all the reports from County Correspondents in the Sixth District.

All of which is respectfully submitted.

ISAAC SNEDECKER.

JERSEYVILLE, ILL., Dec. 6, 1873.

REPORT OF STANDING COMMITTEE ON GEOLOGY AND SOILS.

The report of Captain E. H. BEEBE, of the Standing Committee on Geology and Soils was then presented and read by the Secretary, as follows:

Mr. President:

We learn from our geological survey, that although the face of the country is generally level or gently rolling, that there are some portions of the State more elevated than others. The highest lands in the State lay along its northern line, between Freeport and Galena, where the elevations known as mounds culminate into points of elevation from 700 to 850 feet above the level of the river at Cairo, 1,200 feet above the sea level, and from 100 to 200 feet above the surrounding country. From Freeport, in Stephenson county, southward along the line of the Illinois Central Railroad, (located near the center of the State,) there is a gradual descent to the valley of the Big Muddy, in Jackson county, where the railroad grade is only fifty-five feet above that of the river at Cairo. From this point there is a rapid rise in the country toward the south, and at Cobden the railroad intersects a mountain ridge crossing the southern portion of the State, with an elevation of from 500 to 600 feet above the river at Cairo. The elevations already mentioned in Northwest Illinois, are no doubt the result of denuding forces which have swept away the surrounding strata, leaving these isolated hills as the only remaining indication of the former level of the surrounding country. There are four other principal axes of elevation along the northern borders of the State, besides several of minor importance. These start northerly and cross the State from near Savanna, in Carroll county, intersect Rock river at Grand de Tour, and the Illinois river at Split Rock, between La Salle and Utica. The general trend is from N. N. W. to S. S. E.; its extent in this direction has not been determined. It elevates the coal measures to the surface in the vicinity of La Salle, from a depth of from 300 to 400 feet, thus showing that the disturbance took place subsequent to the coal formation. (G. S. I., Vol. 1, folio 300.) All of the rocks north of the great break north of our State line, and far up in Wisconsin, belong to the Upper Silurian formation. The surface rocks at the time of the drift

period were probably the Niagara, a dolomitic limestone; under this formation the Cincinnati shales, overlaying the Galena, (also a Adamitic limestone.) The glaciers came down from the far northeast, charged with the debris of granite sienite, porphyry, sandstones, clays, etc., reaching the Niagara and Cincinnati shales, they were denuded. Thus charged with new material, the glaciers passed over the great break on to the coal measures, denuding the limestones, sandstones, shales, and clays of the carboniferous formation, it passed on south, distributing its accumulated materials over the underlaying rocks down to the upheaval at Cobden. It is certain that our soils could have been derived but from one of two sources—the drift or the subjacent rocks. That this last was not the source from which our soils in that part of the State laying north of the great break, we offer the following testimony: Prof. Jas. F. W. Johnson, in his lectures on "Agricultural Chemistry," says, in relation to the Magnesian limestone region, in England: "It forms for the most part a hilly country, covered by a reddish brown soil, often thin, light and poor, where it rests upon its native rock." (p. 249,) again (p. 270.) In the eastern part of the county the poorest land rests upon this rock. The Magnesian limestone, in many localities, starts up in the form of raised hills or ridges, on which reposes only a thin, poor soil, formed in a great measure by the rock itself. (p. 266.) Abundant proof has been advanced that a due relation exists *generally* between the rock and soil upon which it rests; yet I would be leading you into serious error were I to permit you to suppose that this direct relation is always to be observed; that in whatever district you may happen to be, you will find the soil taking its character from the subjacent rock, and where similar rocks occur, similar soils are always to be expected. On the contrary, in very many locations the soil is totally different from that which would be produced by the degradation or decomposition of the rock upon which it rests. The prevailing limestone in the region under consideration is the Niagara, a dolomite, or Magnesian limestone, as the following analysis, made by Prof. D. Owen, will show:

MAGNESIAN LIMESTONE—OWEN.

Carbonate of Lime,	47.96
Carbonate of Magnesia,	43.00
Oxide Iron,	2.00
Silex,	3.70
Carbonate of Soda,	.70
Water and loss,	2.64
Total,	100.00

But there is from sixty to one hundred feet of Cincinnati shales underlaying the Niagara, and may not the soil have been derived from this source? We think not. Prof. Whitney analyzed these shales to

determine if they could be used as a material from which to obtain oil or illuminating gas, and found them to contain as follows:

CINCINNATI SHALES—WHITNEY.

Volatile combustible matter	14.12
Fixed carbon	6.84
Incombustible residuum	78 29
Moisture	75
	100.00

He states that the residuum consists of mainly a silicious shale, highly impregnated with bitumen. (Iowa Rep., vol. I, fol. 359.) Shales, as a rule, are generally unfertile; they form a cold, wet, close soil; the shales in question are no exception to the rule. In the cut made by the I. C. R. R., at Scales Mound, twenty years ago, about forty feet in thickness of these shales were thrown out. The pile is there to-day, ten to fifteen feet deep, fifty feet wide, and one thousand feet long; nothing grows upon it; it is as bare of vegetation as the rock-pile on the north side of the cut. It contains no plant food.

The Galena limestone is a Magnesian limestone, containing carbonate of lime, 43.; carbonate of Magnesia, 39.40; silex, 14.50; aluminia and loss, 3.10.

Prof. D. D. Owen, in his report to U. S. Doc. 407—I have analyzed with care the soils of the mining region. The specimens were taken from localities widely apart, from six inches below the surface, with one exception, from wild lands. The analysis of the fifteen specimens are given separately by Doctor Owen. We have combined them, and give the average:

SOIL FROM MAGNESIAN LIMESTONE REGION.

Organic matter (soluble) in Alkali	4.80
" " (insoluble) "	5.13
Salts of Lime, Magnesia, and Aluminum	3.70
Salts of Alumina and Iron	1.00
Siliciceous residuum	82.50
Loss by baking	2.87
	100.00

Specific gravity, 1.84.

Prof. Owens states that the soluble portion of organic matter is supposed to be that which is already prepared to become food for plants. The insoluble portion is that which, by the action of water, air, and other influences, will become so. Thus the amount of soluble organic matter in the analysis is that which indicates present fertility, and that of insoluble organic matter that which measures durability of soil. The conclusions drawn from the above analysis of virgin soil, thirty years ago, have

been verified by cultivation, and the soil proved to be both fertile and durable. We are all familiar with the fact that the drift was not distributed equally over the State. In the northwestern part, the scarcity of boulders and pebbles led to the belief, a few years ago, that it was a "driftless region." Subsequent investigation has, however, established the fact that this was an error, and that the drift did sweep over this as well as other parts of the State. In by far the largest portion of the region in question, the soil rests directly upon the subjacent rocks, magnesian limestones and shales. In this Champaign county, Prof. Worthen says: "The soil in Champaign county is underlaid by irregular alternating beds of clay, gravel, and quicksand of the drift formation, to the depth of from 150 to probably 300 feet. Owing to the various material eroded and transported by the drift in its southern course, and its unequal deposition, a great variety of soil was deposited." My friend, Col. H. C. Freeman, in an article on "Soils in Illinois," says: "In portions of Illinois, spots of whitish clay, *bare of vegetation*, are found. There is another whitish clay, of similar appearance, that forms a considerable extent of surface in the region of the Big Muddy. But this is a stratum of much more recent origin, and often under culture," etc.

We think the Colonel is in error in relation to this last deposit being of more "recent origin," and think that the difference in their fertility will be found to be in a difference in composition of the clays. There is no word so indefinite as that of CLAY, when used by writers on the drift or agriculture.

It may mean:

FIRST—Pipe or fire clay, a substance composed of fifty-six to sixty-two per cent. of silica, thirty-six to forty of alumina, and three to four of oxide of iron, *chemically combined*, and cannot be separated mechanically or by decantation; or.

SECOND—Strongest clay soil, consisting of pipe clay, and fifteen to twenty per cent. of silicious sand, which can be separated from it mechanically; or,

THIRD—Clay loam, containing pipe clay, and from fifteen to forty per cent. of fine sand, which can be separated from it mechanically.

The English writers, in order to distinguish the various clays, have given them local names. Johnson says of

Pipe Clay—Of various colors, some nearly pure white, and used for making pipes; soil various, alternating with beds of sand; it produces soils of most unlike quality, often within a very short distance.

London Clay—Stiff, almost impervious; brown, blue, and blackish in color, forming a strong, heavy, wet, tenacious soil, sticking to the plow like pitch.

Gault Clay—Forms a thin, cold soil, which, when wet, becomes as sticky as glue; is very expensive to cultivate.

Weald Clay—Contains much fine sand; it is pale colored; the soil, when wet, forms a paste which dries and hardens like a brick, so the roots

of plants cannot penetrate it; from the expense of cultivating it, much of it is in trees.

Oxford Clay—A tenacious, dark blue clay; produces a heavy compact soil, difficult to work, and one of the most expensive clays to cultivate.

Elementary substances and their compounds being always the same, the world over, we have every reason to believe that clays similar in composition to the above will be found, that were deposited by the drift, insulated in our State. We hope the day is not far distant when chemists, graduates from this Industrial University, will give us correct analyses of our soils, clays and rocks. Our information in regard to these substances, at the present time, is decidedly mixed. Our teachers slip up occasionally. One of them—a gentleman learned in the law—in writing on the geology of the northwestern counties of our State, says: "It *cannot be denied* that the superficial deposits covering the bed rocks are in part derived from their disintegration by rains and frosts, and other atmospheric and chemical agencies. It is also true of the clays covering some of the Niagara and Cincinnati outcrops, or beds of rocks, for they largely partake of the underlaying rocks, *from which they have been derived.* I think a chemical analysis of these *clays* would show a great *similarity or identity with the rocks under them.*" If the analysis was to be made by a Justice of the Peace, he might be convinced by counsel that a soil, consisting in part of eighty-two per cent. of silicious matter, and containing but four per cent. of lime and magnesia, was "derived" from a rock containing forty-eight per cent. of carbonate of lime, and forty-three per cent. of magnesia, or that clays containing from fifty-six to sixty-two per cent. of silica, and thirty-six to forty per cent. of alumina, were identical with magnesian limestones. But an appeal to the youngest student of geology and chemistry would reverse the case, and send it back for a new trial. The facts are, the soil was deposited by the drift. The clays, found mostly from one to four feet thick, at the junction of the Cincinnati with the Niagara, and far down in the strata of the Galena, were deposited by the old Silurian sea, and are a part of this formation.

We have for some years past entertained the opinion that the study of geology and soils should be taken up by the local Horticultural Societies and Farmers' Clubs. A series of investigations of rocks and soils, accompanied with observations of facts in regard to the growth of varieties of trees, fruits, and cereals, would, in my judgment, be of great use in making up fruit lists, etc. Such papers, incorporated in the transactions of the State Horticultural and Agricultural Societies, would be far more interesting and *instructive* than reams of papers such as this—made up of general statements and facts of no use, unless locally applied and tested by the practical farmer, horticulturist, and tree planter.

MR. MCWHORTER—There is one little thought that strikes me in connection with this report. The traveler who travels up north of Lake Superior, in Canada, and notices the hard, crystalline condition of the

rocks, feels staggered in believing that the grinding of these rocks by glaciers could ever have occurred to such an extent as to have brought down material sufficient to cover the whole State of Illinois, to the depth of from ten to one hundred feet.

In reading the transactions of the Scientific Association at Portland, Maine, I find that Dr. Hunt made a statement that the whole Appalachian and Alleghanian chain of bed rocks are in a rotten or decaying condition to a great depth. The old rocks are there *in situ*, but in a decaying condition. It strikes me that there is the only spot where the rocks have been laying for long geological ages—the Appalachian chain—and have not been subject to diminution by glacial action.

Now, here is one thing that relieves us from this staggering doubt of the possibility of so much soil having been ground up from the rocks of our northern region, and transported here. We may readily suppose that all these bed rocks have been in the same condition as those named—just the condition to be denuded by glacial action; and hence our soil may have been obtained from old, rotten rocks, subject to conditions which we know nothing about—perhaps climatic conditions of which we are now wholly ignorant. In all probability, such has been the case; and these northern rocks, long back of the time we have thought of, have been in that condition, and the glaciers have ground them away when in that condition. This relieves my mind of something that had previously staggered me.

MR. GALUSHA—Is it not a fact that geologists consider this decaying rock the oldest rock in America?

MR. MCWHORTER—It is not supposed, but it is known to be. The underlying strata must be the oldest, and that Appalachian chain constitutes the oldest rocks—not as old as the Canadian rocks, but the oldest subject to glacial action.

The meeting then adjourned until two o'clock P.M.

THIRD DAY.

AFTERNOON SESSION.

The Society re-assembled at two o'clock, pursuant to adjournment, the President in the chair.

CO-OPERATION WITH STATE GEOLOGIST AND ENTOMOLOGIST.

Mr. Greene—I suppose the subject under discussion is not disposed of. If not, a resolution I have drawn would be in order. I will read the resolution :

Resolved, That this Society appreciates the benefits which would result from a co-operation of the members of this Society and other industrial and scientific societies with our State Geologist, State Entomologist, and perhaps all other State officers, believing that such officers might be greatly aided in their observations and researches by furnishing to these societies schedules of questions setting forth the information desired, so that local observers could have some knowledge as to their needs and desires, and thereby render assistance intelligently and effectively.

Resolved, That the Secretary of this Society shall furnish a copy of these resolutions to each of the officers above named, and to the Regent of the Industrial University, asking their attention thereto, and tendering to them the co-operation of each member in such manner as shall best promote their purposes.

Mr. Greene—In offering these resolutions I wish to say just one word in regard to what I consider the importance of this course. We all are making observations ; one or more, and sometimes a dozen members are making these observations intelligently. We all know that our officers are at great expense in traveling over the State to collect this information for themselves. Dr. Le Baron, I think, would bear me out in saying that he would be benefited with this course, in giving him information, and it may suggest itself to your minds to let him dictate the kind of facts he wants you to report ; then he has got something definite, out of which he can gather information. I know that is the case in my own matters, and, as suggested by Captain Beebe, I have seen fit to put it in the form of a resolution.

Mr. McWhorter—A question arises in my mind—there might be some little obscurity as to what class of information our local societies shall furnish.

Mr. Greene—I ask that these officers shall furnish a schedule of questions which members of local societies and others shall use as a guide to their observations. If these officers could find intelligent men who

pursue the line marked out by them, and would answer such questions as they might desire, can you not see that their expenses would be saved, and further than that, it would educate a corps of observers, and it would be done much more rapidly than now?

Mr. McWhorter—There is one little difficulty which seems to arise. It would be very difficult for the State Geologist to find individuals all over the State on whom he could rely with any confidence whatever, to report to him what were the characters of certain rocks so as to enable him to determine to which family they belong. It is true he might hunt out individuals who would forward to him valuable information; but there is so much to be known about the rocks in their own character, and in their relations to other rocks; and to a certain extent the same may be said of fossils—that it would be difficult to find men who could give the required information.

Mr. Greene—That resolution is presented under the idea that the State Geologist is not the only man having information or knowledge of his subject; that the State Entomologist is not the only man having knowledge of *his* subject. If that were so, does it not appear that these officers would have no constituency to appeal to, and who would appreciate their work? I am not willing to admit that they embody all the knowledge in reference to the sciences they have charge of. They may not find experts in these particular sciences, but in this way collect much information that may be useful to them.

It is to establish such a system of correspondence as that that these resolutions are intended. We underrate our ability when we trust any man or set of men to do all our thinking and all our observing. Let us bring out all our information of the State and concentrate it, and not be years in gathering information which can be gathered in a month. I do not suppose that it is going to supply all the information and answer all the purposes of any one of these gentlemen; it is simply to assist them in bringing together such general facts as are necessary for them to form conclusions. If you have a local society of fifty or twenty-five men, don't you encourage among them the inculcation of these sciences when you give them questions that they can work to? Now there is many a man who observes, almost every day, little things of real importance, that he never has an idea will be of any use to the State Geologist or Entomologist, but which, if reported to these officers, will be of great benefit.

Mr. McWhorter—I am satisfied the resolution embodies the right principle, and I admit that some useful information could be obtained

through the local societies, especially to the State Entomologist; he could learn about insects, of which he could not otherwise learn; and the Geologist could learn something about the outcropping of rocks. Upon the whole, I think it is something of importance.

The resolution was then adopted.

REPORT OF STANDING COMMITTEE ON VINEYARD CULTURE.

The report of E. C. Hatheway, of the Standing Committee on Vineyard Culture, was then read by the Secretary, and was as follows:

To O. B. Galusha, Secretary Illinois State Horticultural Society:

Dear Sir—In response to your request "to write an article on Vineyard Culture," I will say that in order to speak of this subject intelligently as regards the crop the past season, and to learn conditions of the same, also to get experiences of others so as to make this report of a general nature, I have addressed inquiries to a great many vineyardists in the northern part of the State; but regret to say that but few have taken pains to respond to such inquiries; therefore I have failed to learn sufficient, I fear, to make this article of general interest.

The winter last past, if taken for a test, has given us much to consider in the matter of hardiness of varieties of the grape, and has thinned down those claiming the merit of hardiness to a very few in number. While we may not expect another winter so severe for a long time, perhaps, yet the condition of the vines was, in most cases, never better to enable them to withstand the severe test applied to them, than they were upon approach of cold weather in the fall of 1872, especially so in consequence of the wood being more thoroughly ripened than usual. Many claim that vines had received their death blow in consequence of the extreme drought the summer previous.

In the case of very young vines, and also uncultivated vineyards, run upon the plan of "wholesome neglect," no doubt this may be true to a great extent; but thus far I have found but one or two individuals, who have thoroughly cultivated their vineyards, that have lost any vines, except of the newer, tender sorts.

The Concord has, in the matter of hardiness, been found to stand at the head of the list, and considering its ability to stand "grief" in every form, is pre-eminently the "grape for the million." As to its wine-making qualities, there are many other varieties much superior, but they are all more or less variable in quality, and but few are reliable in the production of regular crops.

Next to the Concord the Perkins has of late claimed our attention; not so much for its fine quality of fruit as for its hardiness, and regular annual production of a full crop; which, on account of its color, size of cluster and berry, and extreme earliness, make it one of the most profitable market grapes we have. Compared with the "Martha," I consider the Perkins better in every respect, being earlier, larger berry, larger

cluster, not having any more, if as much, foxiness, while it possesses the merit of being absolutely hardy in every situation, without any protection.

Clinton has been, and is now, one of our very best wine grapes, but on account of its being subject, to so great an extent, to the ravages of the "*thrip*," is being rapidly rooted out to make room for other thicker-leaved varieties. This is to be lamented, as in the matter of hardiness it is absolutely *frost-proof*.

Eumelan, Croton, Walter, and most of Rogers' Hybrids, together with a great many other varieties, fared badly by the cold weather last winter, and reports of their being killed, both root and branch, on all sorts of soils and under all sorts of circumstances, even when well protected, have reached me from different points.

Catawbas, Delawares and Dianas, mostly killed down to the ground, but the roots in most cases are uninjured and have thrown up extraordinary strong canes the past summer. Hartford, though in many instances unprotected, not as badly injured as Ives and many other varieties considered hardy. Martha, where protected, all right; unprotected, somewhat injured.

From some localities come good words for Crevelling, Ives, Black Hawk, Rulander, Northern Muscadine, Telegraph, and some others, but as a general thing Concord receives its full meed of praise, while other varieties are spoken but little of.

As to any disease affecting the vines the past season, I have as yet not learned of a case of either rot or mildew anywhere in the Northern District; neither have I heard of grapes cracking, as frequently has been the case in other seasons. This last result, no doubt, is due to the fact of the very general absence of rain during the period of ripening.

What were the birds doing, that they committed no depredations on the grapes this year? With me they seemed as plenty as last year, and while last year they made sad havoc in all vineyards which came within my notice, this year I have not seen a single grape touched by them.

Insects have, as usual, damaged the vines and fruit to some extent; chief among these is the *thrip*, which in some vineyards has almost entirely defoliated many of the thin-leaved varieties, such as Clinton, Norton's Virginia, Delaware, some of Rogers' Hybrids, and many others. The little gray flea beetle has done considerable damage by eating into the buds, but the depredations of this insect seem confined to a few localities in this district, as I have received but two complaints of it this year; the hog caterpillar and blue caterpillars, also the grapevine sphinx, have committed some depredations, but not to any great extent; the grape codling has damaged the fruit of some vineyards, but its attacks have not been general; leaf-folders have worked industriously, but little is to be feared from them, if the wood pruned from the vines in the fall and winter be carefully gathered and burned.

One correspondent, from Carroll county, reports "a bug about the size of a fly, gray, with minute black specks;" he says "it comes in swarms and attacks the leaves on the *upper* side leaving only a skeleton."

I know nothing of this last insect personally; probably our State Entomologist can give information concerning it.

So far as destroying our insect enemies is concerned, there is *one* way, and *only* one, that can be depended on, and that is, *determined* and *persistent effort*, on our own part, in hand-picking them or entrapping them by some device. This waiting for Dame Nature to discover when one species of noxious insects is in the ascendency, and then getting up a parasite to prey upon and reduce it, is, or should be, "played out" in the minds of sensible cultivators. No doubt but Nature aims to keep an equal balance poised in insect life, yet under varying conditions it is often the case we find the beam far from level, and as the motto on our State Society's seal declares that "*This is an art which does mend Nature*," then why not assist her with our best efforts, in attempting to control these unruly subjects.

I find but one way to destroy the caterpillars and sphinx, and that is, to hand-pick them. Many of the beetles can be caught by jarring them on sheets spread under the vines, or into pans carried in the hand. By far the most efficacious way, however, of destroying *most* insects, is to suspend open-mouthed vessels among the vines, partly filled with sweetened water, with a little vinegar added. Any one that has never tried this plan will be surprised at the "*catch*" upon doing so. I know that many have condemned this latter method, claiming that it destroys our insect friends as well as enemies. I will say that in using it for five years I have never yet found an insect destroyed that I knew to be beneficial—not even a *lady-bug*—while I could count gallons of beetles and other insects injurious. One insect, however, that has quite baffled me, is the *thrip*, or leaf-hopper. You can't trap the rascal with sweetened water, and you can't jar him down on a sheet, or into a pan. Stir up a swarm of them, they make a little circuit, and settle at once right back to business again. The only way I could ever capture any (and then the *catch* hardly paid) was, at night to take a large shallow pan, partly filled with soap suds, in the centre of which I placed a lighted tin torch. One person carries this along the rows, while another, passing along the other side, beats the vines carefully, which stirs up the insects, which fly for the light, many of them being destroyed by the flame, while some others fall into the suds and are drowned. I have never been entirely satisfied even with this plan, and this last fall have dug out all varieties which are preyed upon by the *thrip*—sufficiently to damage them—and shall replant with other varieties with thicker leaves, or more pubescence upon the under side of the leaf, which effectually prevents the attack of this pest.

I am aware of the fact that even among our own Society members there is very much difference in opinion respecting the question of culture or non-culture of vineyards being most profitable, and therefore approach the subject with hesitation. I will say, however, that I have addressed many grape-growers upon this subject, asking for their experience, and have almost invariably received answer couched either in the words or spirit of the reply received from our eminent brother horticul-

turist, S. G. Minkler. He says, emphatically, "The matter of good culture of the grape being most profitable, does not admit of a question." Some have replied that they found very little difference in the result of either practice, and little profit in either case. Of these latter, I have had a lingering suspicion that they were either imbued with a little inborn laziness, or had allowed their vines to suffer neglect, through attempting to do more or take care of more than they were able; and this suspicion has been verified in visiting the vineyards of no less than three or four, from whom I have received such responses, when the sight which presented itself raised a question in my mind as to whether the attempt was being made to raise a crop of grass and weeds, or grapes. If the first, then it was a grand success; if the latter, it was certainly a lamentable failure. Do you suppose, for a moment, that the parties owning these vines would think of admitting the fact that the growth of weeds and grass had any thing to do with the sickly-looking canes, small, ragged, scattering clusters of fruit composed of miniature berries? No. They would reject any such insinuation with emphasis, and at once cite your attention to the "*terrible drought*" as being the cause, forgetting, for the moment, the fact that the drought had not been so terrible as to destroy this strong and rampant growth of weeds and grass, which was even then sapping the very life of the vines. On the contrary, I have heard but little complaint of poor crops or poor grapes from those who have well and thoroughly cultivated their vines; and from such vineyards the product has, in the main, brought good prices.

There is no doubt in my mind that five cents per pound will pay for Concords where good culture is practiced; as this variety is capable of producing on an average, annually, fully twenty pounds per vine, without detriment or injury to it. Reckoning six hundred vines to the acre, planted 8 x 8 feet apart, each vine carrying six canes, trained to wire trellis, each cane five feet in length—thus planted, pruned and trained—the Concord will produce, at the above price of five cents a pound, $680 per acre. Allowing $200 as interest on original investment, which is ample, and $100 per annum for cultivation and other expenses attending marketing, etc., leaves $380 net per acre. Where is the land farmed in corn or other products that will produce any more?

The above statements are not fancy but facts, and have been more than demonstrated in my own experience. I have not mentioned wine-making in this communication, as all of this Society are, to some extent, conversant with the method of making and cost of same.

Before closing I wish to remark that I have never seen a soil yet, upon which the grape has been planted, but that might been made better by use of manure in some form or other; thus, in hard clays, deep plowing, trenching, and the use of lime, and alkaline manures, will be found beneficial; on all soils a limited use of salt or soda, with gypsum, ashes and phosphatic manures, will be found to act wonderfully. On light soils nothing in my experience is so good as a compost of sods and cow manure, applied as a top-dressing during summer.

Of all things nothing is so necessary as thorough drainage. Grape-vines may possibly succeed in almost all other situations, and mature a crop of fruit under almost all circumstances, however adverse, *but with wet feet never*; therefore, if there is not good natural drainage, then it must be artificially secured, or we may hope against hope, as we never will see a realization of our fondest dreams.

Claiming indulgence for occypying your time with these rambling remarks, and sincerely regretting my inability to be present at the session of our Society at Champaign,

I remain, fraterually yours,

E. C. HATHEWAY.

DISCUSSION ON MR. HATHEWAY'S PAPER.

After a desultory discussion, in which Messrs. McWhorter, Hays and others took part,

Mr. Riley said: There is one fact that I would mention that perhaps would aid Mr. Hatheway and some others. I think he referred to one insect—the leaf-hopper as "thrip," which should not be called "thrip," but "leaf-hopper." The best preventive measure to that insect is the application of some sticky substance to the stalks, in the winter time or early spring; or the hanging of paper sheets, or any thing that has a broad surface, covered with a sticky substance. Mr. Hatheway expresses very little faith in destroying insects by any thing except by hand. I protest against that. If he will try to *prevent* them he will do more good than in that way. Now, by the use of soft soap and other materials on the posts erected on vineyards, he will accomplish a vast amount of good.

I mention this because it is a feasible plan. A good way to destroy leaf-hoppers is to take a torch through the vineyard, and have some one with you to disturb them, and you will find they fly to the torch and are very soon destroyed. The insect that is frequently called "thrip" is the little "leaf-hopper" which is not more than 3-100ths of an inch long. It injures the leaf by puncturing, and becomes very numerous. Entomologically the term "thrip" is applied to insects that are beneficial rather than injurious.

There are various other terms used in the report which are not strictly correct, but it is hardly worth while to mention them.

PLUM CULTURE.

At the request of the Secretary, Mr. Greene read the following paper on Plum Culture.

NATIVE PLUMS.

BY EDW. H. BEEBE, GENEVA, ILL.

Mr. President:

In the Chicago *Tribune* of May 7th, 1873, we find, under the head of "Farm and Garden," an article on the Plum, by "Rural." He states, in regard to a variety called the Wild Goose:

"Some years ago it was said that a wild goose alighted in a garden in the State of Tennessee; and that, a few days later, on the very spot that she had rested, up sprung a Plum tree, and in time this tree produced a prolific crop of Plums; and those Plums were never to be attacked by the curculio or the fungus. The marvel went forth as

"*The Wild Goose Plum*, and to-day the nurserymen tell us that it is the long-sought-for Plum; that it is to be to plum-growing what the Wilson is to the Strawberry, the May or Early Richmond among Cherries, or the Winesap among Apples. With these assurances, it has gone into many gardens of the Northwest as a coveted treasure, where its habit of sprouting will soon make Plum thickets, if not Plum pies, Plum marmalade, and Plums canned and dried. Some of these Plums are mottled, sometimes red, and again yellow or white; in short, it partakes so nearly of the nature of the Wild Plum of Tennessee and other Southern States, that we might be led to suppose that the tree had been indiscriminately taken from the thickets of red, yellow and mottled Plums, instead of a single variety that some foolish goose had eaten somewhere, and, not being able to digest the seed, buried it in the garden of some honest planter, to become famous in Plum tree history. What became of the mother goose, is not related in this history; and the facts as above stated remain, and are just as true to-day as they were the first time that they were repeated.

"I have a dozen of the trees, that for the first time are filled with bloom, and there are at least eight distinct varieties, if the habits of the trees are any indication. The fruit is small, of little or no value for the table, but very good for canning, and, though not curculio-proof in this part of the State, are little injured—whether from the small size of the Plums when the curculio is intent on egg-laying, or from the toughness of the skin, I shall not attempt to decide. On the whole, the tree has been a good thing for some nurserymen and tree dealers, and it has yet to be proved whether it will pay for planting north of the Ohio river. In Tennessee the fruit is much larger and of considerable value, and begins to ripen the last of June. On the whole, we would advise nurserymen to be careful, and select from this family of Plums one or two of the best, and thus at least protect their reputations from unpleasant suspicion."

In the same paper, under date of May 15, Mr. D. L. Adair, of Hawesville, Ky., says in reply to "Rural":

"HAWESVILLE, HANCOCK CO., KY., May 15, 1873.

"SIR: Noticing your article in *The Chicago Tribune* of the 7th, I take the liberty of sending you a copy of the *American Journal of Horticulture* for March, 1869, containing an article of mine on 'The Plum, and Its Improvement.' Since that time, I have paid considerable attention to the Plum, and am making its cultivation a specialty. The Miner (Townsend) I find of no value here. The true Wild Goose is a superb Plum. The Newman I place at the head of the list. Hattie Porter, De Caradenc, and a number of others promise well. The Newman and Chicacherry are the only Plums that are entirely exempt from the depredations of curculios on my grounds. The Miners were all stung last year.

"Yours truly, "D. L. ADAIR."

Never having seen this variety, we do not consider that we are "sound upon the goose;" persuming that those who have grown it are so. we shall leave the disputed points in regard to it to be settled by the ganders.

But we have something to say in regard to the Miner that Mr. Adair says were "all stung last year."

We very much doubt the fact; for we cannot conceive it to be possible, or even probable, that a plum that has annually withstood the attacks of the curculio and plum gouger for thirty-eight years in Illinois without material injury, can be subject to destruction in Kentucky *or anywhere else.*

Our late State Entomologist, Benjamin D. Walsh, says:

"The Miner Plum is almost curculio-proof, though it is attacked to a limited extent by the plum gouger. We report, therefore, that the Miner or Hinkley Plum is certainly the Plum for the million on account of its hardiness, productiveness, and almost complete exemption from the attacks of the curculio. (Am. Entom., Vol. I, fol. 93.)

"Our present State Entomologist, Dr. Wm. Le Baron, says, in a paper published in 1872: '1st. That the eggs deposited in the Plum (Miner) by the plum curculio generally perish without damaging the fruit. 2d. That in many cases the larvæ of the plum gouger penetrate to the stone, but perish without damaging the Plum.' Prof. C. V. Riley, State Entomologist of Missouri, to whom fruit-growers are indebted for one of the best papers ever written upon the curculio, says: 'The Miner or Hinkley, and other varieties of that wild species known as the Chickasaw Plum, are less liable to curculio attacks than other kinds.' (Trans. Ill. Hort. Soc., Vol. III, fol. 85.) We close the buggy part of this paper in the words of Benjamin D. Walsh: 'As to the complete exemption of the Miner Plum from injury by the curculio *there can be no doubt; on this point all authorities agree.*'"

In view of the above testimony we are inclined to believe that the Kentucky Miner was a bogus, (a variety extensively dealt in by tree pedlars); or it might have been a *gosling.* Rural says the *curculio will bite the goose,* and we all know he is a man we can tie to; or it might have been a seedling. It is an established fact that the Miner or Hinkley plum will not come true from seed. The seedlings are not good Darwinians, and do not develop worth a cent, but go back toward their wild state every time. Bushels of seed have been sown, and as yet not a single seedling has been produced equal to the Miner. The tree is a prolific bearer; the fruit, when ripe, falls to the ground. In gathering up the ripe plums more or less will be trodden into the soil, and from pits thus planted seedlings will come up. Thousands of seedlings, taken from around genuine trees, have been sold by the pedlars in the Northwest, and have disappointed the producers by producing worthless plums, inferior to the common wild plum grown in the neighboring thickets.

Up to 1868 the plum in question was almost unknown outside the mining region. It was a kind of family affair, and had as many names as a new baby; it was known as the Hinkley, Townsend, Isabella, Robinson, Chickasaw and Miner. The Illinois Horticultural Society thought, as the child was thirty-five years old, it was about time it should be christened; and at the Dixon meeting, in 1870, a committee was appointed to collect facts in regard to the name and origin of the plum, and report at the meeting to be held at Rockford, in 1871. The committee, by H. H. McAfee, reported:

"That they find under cultivation, throughout this District and adjoining States, a class of Plums known by many different names, more or less of a local character, which

show in their habit of growth and foliage traits of a common origin. They are evidently a variety of the *Prunus Chickasa*, a native of this State as far north as East St. Louis. The name Miner has been oftenest used in connection with this class of Plums, and evidently with no justice or propriety; for by all pomological rules the naming of a new fruit should belong to the first producer, or the person first discovering it; neither of which would entitle Mr. Barber, of Lancaster, Wis., to name this Plum 'Miner.' The facts of the history of this Plum can now be traced no farther back in time than to the year 1835, or in locality than to Ohio.

"A nurseryman named Knight, from Ohio, brought a lot of fruit trees to Galena in 1835; all of his Plum trees were sold to Major Nathaniel Hinkley, who disseminated them (gratuitously) and urged their cultivation by his neighbors. The next year (1836) Knight brought out a new stock of Plum and other fruit trees, and established a nursery in the Townsend settlement, eastern Jo Daviess county. From this stock the Miner originated. No doubt many seedlings have been planted since 1836, for to-day more than fifty varieties are scattered over the Northwest, and called by various names, but all showing plain Chickasaw characteristics. The great point in favor of the Chickasaw is their general immunity from injury by the curculio; for some reason the egg fails to hatch, so the damage from this cause is never serious. The plum gouger also preys upon it, but does but little injury. As a Plum for profit in our district, which is poorly adapted to the finer tame Plums, the best Chickasaws stand second to none, if fruitfulness and ease of production be taken into account. No healthier Plum tree grows; *and their general and extensive cultivation is hereby recommended.* In view of the facts above stated, the majority of your committee would recommend that the Plums derived from Knight's stock (except seedlings) be known hereafter as the HINKLEY PLUM.

"H. H. McAFEE,"
"JAS. G. SOULARD," } *Committee.*"
"EDW. H. BEEBE,"

The report of the committee was adopted.

The true Hinkley, as well as many varieties of seedlings under various names, are scattered over the counties of Jo Daviess, in Illinois, and in La Fayette and Grant, in Wisconsin, generally in small orchards of a few trees for family use. Genuine stock can be procured from the nurserymen at Galena, Ill., and at Platteville and Lancaster, in Wisconsin. A number of the plum trees planted 1835–36 can be found in Jo Daviess county. They are at the Townsend farm, near Warren, and at the Soulard and Hinkley farms, near Galena. On this last farm there are now ten to thirteen trees planted by Major Hinkley thirty-eight years ago. D. Wilmot Scott, who visited this orchard in 1870, says:

"One day last October, we took a walk out to the original Plum orchard of Mr. Hinkley, about one and one-half miles from the city, for the purpose of examining the parent trees of this variety of Plums. At a short distance, the trees looked like large sized Apple trees, in shape, height, and general contour, but on a nearer approach, the fact of their being Plum trees was readily distinguished. The trees have evidently stood where they now stand, thirty-five or forty years, but are of good vigor, and bear large crops of fruit, though standing in the grass. The trees were planted thirty feet apart each way, the tops now covering the whole space, and in some instances interlocking."

In the winter of 1871 we visited this orchard and accurately measured five of the Hinkley plum trees, as follows:

No. 1—To crotch, four feet; circumference at crotch, three feet two inches; two limbs, circumference twenty-six and twenty-eight inches.

No. 2—To crotch, two feet six inches; circumference at crotch, three feet seven inches; four limbs, twenty-one, twenty, twenty-three and eighteen inches in circumference.

No. 3—To crotch, two feet eight inches; circumference at crotch, three feet four inches; four limbs, eighteen, sixteen, twenty-six and twenty-five inches in circumference.

No. 4—To crotch, four feet; circumference at two feet from soil, two feet ten inches; four limbs, nineteen, twenty-three, twenty, and fourteen inches in circumference.

No. 5—To crotch, three feet; circumference at two feet from soil, three feet five inches; three limbs, twenty-seven, twenty-one, and twenty-nine inches in circumference.

The branches will cover a circle of from twenty-five to thirty feet, and the trees are from eighteen to twenty-five feet high.

Fruit, deep red; round, from one and one-fourth to one and three-fourths inches in diameter; firm texture, with rather thick skin; ripens from last of September to first of October; quality, *better*.

The trunks of the *Prunus Americana*, at thirty years of age, rarely exceed eighteen to twenty-two inches in circumference; not as large as many of the limbs of the Hinkley.

"Rural" gives us his experience in his attempts to cultivate the bug varieties of the Plum. What with fungus, rot, curculio, caterpillars, chip traps, and divers other nuisances appertaining to the cultivation of these varieties, he has had a gay old time of it. After a dozen years of failure he has at last concluded to try the Hinkley, and says that his reasons for doing so are:

"Our Galena friends are enthusiastic over it, and I have great confidence in their judgment, as they are among the best horticulturists in the State, and thus far have had no ax-grinding or disposition to impose on the public. The fruit men of the grand chain and of Alton have generally looked upon the northwest corner of our State as of little value for fruit-growing; but, with the exception of the Peach, a visit in summer among the hills and valleys of Jo Daviess county will dispel that illusion, for the orchards of the Apple, Pear, Cherry and Plum, and the vineyards, are proofs that nature and art combine to show that lead is not the only product of this region."

We can assure him that if his "confidence" in his Galena friends has prompted him to set out forty Hinkley Plum trees, as he says he has, he will (if they are genuine) realize, when they commence bearing, that he is not a victim to misplaced confidence. We would advise *any other man* that prefers growing plums to curculio, to follow the example set him by the worthy President of this Society.

DISCUSSION UPON PLUMS.

Mr. Greene—I have had a little experience in planting, but not in gathering from the Wild Goose plum, as my trees were not in bearing when I left Tennessee. There is a variety in Tennessee called the Wild

Goose plum, which is one of the best plums I have ever seen. It is of a clear crimson color, very large in size; I have never seen it cultivated. The true Wild Goose plum tree has every characteristic of the common Chickasaw plum, but the fruit is at least three times the size of the Chickasaw. I have nothing of its history to advance. If it can be obtained true, it is really worth while cultivating, and worth trying in this section of the country.

Mr. Dunlap—I have got fifty trees, and I think there are fifty kinds.

Mr. Mahan—I received a variety of the Wild Goose plum from a gentleman at Tamaroa, and budded it in peach at Centralia, and it has come into fruit since I came here (Champaign). I am told it is a very large and beautiful plum, and spoken of in the very highest terms. It bore fruit last year, after a hard winter. When I was there last spring, I got buds from the tree, and while the peach stock upon which it was budded was killed stone dead, the top part was alive, and I cut cions from it, and grafted them in here, and they lived, so that I have grafts growing that came off trees that were dead at the bottom. I am disposed to believe it is a very fine fruit, very large in size, and of ruddy color on one side. I know that the same kind of plum is borne on trees near the Ohio river. This gentleman got it from somewhere in Tennessee, and he sent me a dozen or twenty young sprouts.

Mr. Wier—I recollect seeing that article in the *Chicago Tribune*, and I took issue with it, the same as Mr. Beebe has, and intended to have an essay on the subject at this meeting. Still, there are some facts Mr. Beebe does not mention. I have had this plum in fruit three years, and I know it is a very good thing to have. Last winter, it proved hardier with me than the Miner. There is no doubt but where there have been hundreds of varieties of plums of the Chickasaw family sent out as "Wild Goose," as Rural says in the *Tribune*—yet there is only one true variety of that plum. It may be known by having leaves waved on the edges, and also notched. It is a plum about as large as the end of the thumb—not quite—of a clear scarlet red, ripening from the 17th to the 24th of July. It can be shipped ripe to almost any distance or anywhere, as it will ripen up on the passage. As early as the 10th of June last, they were sold at from three to ten cents each. I think the past winter has demonstrated that it is fully hardy enough to stand the winter in any part of Illinois, and I think there will be as great a demand for it within five years as there is now for the Early Richmond cherry. It is

very much better than the Miner, as the skin of the Miner is so intensely sour that it is almost impossible to sweeten it, while the Wild Goose does not have this extreme acidity in the skin nor around the stone. As to being curculio-proof, I think it is fully equal to the Miner.

Three years ago last summer, I received from Mr. Downer, of Kentucky, an excellent plum, about one-third less in size—a freestone, which promises well.

Mr. Shephard—Were these the plums you showed to me at your house?

Mr. Wier—I think so. I had packages four different times. It ripens from the middle of August to the middle of September. We also have, in this family of plums, a plum that I got as Peach Leaf plum, resembling the Wild Goose more than it does the Miner. It is very much smaller than the Miner. I have never seen the mark of the curculio on this plum. The skin appears to be so hard that the curculio cannot hurt it. As for the Miner and the other ones, it is not so.

Mr. Nelson—The stock of the Wild Goose plum—was that the Downer stock?

Mr. Wier—Yes, sir; and I noticed that the leaves were waved. Still, I have a Wild Goose plum in which they are not.

REPORT OF VICE-PRESIDENT FOR FIFTH DISTRICT.

The Secretary next read the report of B. Pullen, Vice-President for the Fifth District, as follows:

Mr. President and Gentlemen:

The Vice-President elect for the Fifth District, Mr. J. C. Cooper, having removed from the district and State in the early part of the year, I consented, upon request of your Secretary, to perform his duties and furnish a report. The following is submitted:

Most of you will remember that I reported for the same district last year, and that it was any thing but a hopeful or encouraging r eport. wish a more prosperous condition of things could be reported for 1873, but a proper respect for the truth will hardly admit of it. Disaster has followed disaster until we are left in a sort of chaos, and the future of Horticulture in the Fifth District looks chaotic, indeed. It is to be regretted, also, that county correspondents, with one exception, have failed to respond, limiting, with that exception, this report to personal knowledge, observations, and to such inquiries as I have been able to make during the season. All of you are acquainted with the severity of the past winter, the thermometer indicating with us from 30° to 34° below zero. The unusually heavy crop of fruit, and the dry season of

'72, had the effect, no doubt, to very much reduce the vitality of all fruit trees, therefore leaving them in a poor condition to withstand the shock that such a degree of cold was bound to produce upon them, even under the most favorable circumstances. The result, at least, verifies the presumption that such was the case. Nine years ago the degree of cold was as great, or nearly so, as the past winter, but for some reason the damage was not so great; then I observed that the branches seemed to have sustained greater injury than the bodies, and those who cut back the tops of their trees were well paid for their labors, and those who did not suffered most. The cold of the past winter injured bodies more than the tops, and those who pruned back in the early spring fared worse than those who did not. You can draw your own conclusions. I will state some of the peculiarities as to the effect of the cold on some of the different varieties. I believe all apple trees were injured, the older trees less than the younger; an occasional tree was killed; the same may be said of the pear trees.

Of the peach, we think we are correct in estimating three-fourths to be killed, and those left that have any promise in them are the younger trees, from one to four years; but many of the latter age are dying.

Cherry trees, Early May, are fully one-half killed, and we think those remaining are rendered worthless, if we except a few of two or three years' planting.

Grape vines were killed to the ground, unless in some way protected; all, however, have thrown up new wood from the roots, and promise well for the coming year.

Of raspberries, the canes were generally killed, though a few escaped, where there seemed to be a partial protection, and bore a light crop; some claim that Davison's Thornless escaped without harm.

Blackberries, both native and improved, were a failure, being killed to the ground.

Currants and gooseberries were uninjured and bore full crops.

The strawberry crop was light; the acreage, much increased by last spring's planting, and the prospects for the coming crop much improved over that of the present year.

The crown borer is still among us, but for some reason does not seem to have been so destructive as last year.

But little has been done during the past summer but clear away the wreck, and much remains to be done; nor does there seem to be but little inclination on the part of growers to renew their orchards. Amidst all this disaster there is a grain of comfort to the fruit grower in the reflection that it will be likely to confine the business in the future to its more legitimate channels. The storm of July seems to have completed the destruction in that part of the district through which it passed. It struck the district in Marion county, and its course was in a southeasterly direction. Many apple orchards were ruined by this storm, the trees being blown flat and uprooted; immense destruction was done also to our forest timber, as well as to buildings, fences, etc.

We shall say nothing about varieties, as nothing reliable can be suggested owing to the unfavorable circumstances attending the fruit raised. Apples and pears bore a very light crop, scarcely sufficient to supply the demands of insects, which were very numerous. The absence of peaches and cherries caused the curculio to confine its work to the apple. Some isolated apple orchards bore fair crops of fair fruit.

I will conclude by introducing here the report of Mr. J. Edward Clark, of Grayville, Illinois, calling your attention to the fact that his report covers the southeastern part of the district. He writes:

"I give you such information as I possess in regard to condition of fruits in this section this present season.

"*Apples* will be rather below the average, but in fair quantities.

"*Peaches*—I can hear of a few in some places, but as a crop this year, in Wabash, Edwards, Wayne, and White counties, it must be considered a failure.

"*Pears* are not grown largely here; crop small.

"Small fruits generally good; *Strawberries*, fair.

"*Raspberries*, plentiful and fine.

"*Blackberries*, not so good.

"*Grapes* fine and plentiful on vines.

"Many parts in this section of country are broken, yet beautifully adapted to Apple, Pear, Peach, and all the small fruits, all of which have been very plentiful and good of late years, except this year, and one year six or eight years ago. In my own small inclosure, in Grayville, I have all varieties of Peach from earliest to latest, and always (this year excepted) had an abundant supply for my large family, to eat, can, and even dry. My Grapes are Concord, Catawba, Delaware and Isabella, all full of as fine looking Grapes as I could wish; my Raspberries, white and black, are plentiful and good; my Strawberries did not do so well this year. Altogether, I certainly should say, from eighteen years' residence here, that our soil is eminently adapted for all the various fruits suited to this latitude, and we only want proper cultivators to make fruit-raising a complete success."

Respectfully, B. PULLEN.

DISCUSSION ON MR. PULLEN'S REPORT.

Mr. Flagg—I notice that Mr. Pullen speaks about the crown-borer, and I want to ask Mr. Riley, or some one else, what is its prevalence this year, and the best means of getting rid of it?

Mr. Riley—In that crown-borer you have a very good illustration of what can be done in the way indicated by Mr. Greene's resolutions. I have always been anxious to get observations of the different insects. This one was first described by myself three years ago, and I there and then stated that our ability to get rid of it depended upon its habit. If it turned out to be two-brooded, we should have difficulty with it; if it was single-brooded, it would be easily mastered. The beetles do not mature until the fruit ripens, and if you will only plow up your vines and destroy them with their contents—if you will adopt the renewal system, instead of allowing simply the runners to replace the old vines—you will destroy them. You must fight the larvæ in the roots of the strawberries, all through the spring months, until late in June or the beginning of July.

These insects bore into the crown and into the root, causing the plant to heave from the ground in the winter time, and very frequently separating it from the roots.

You have had better opportunities of knowing them than I have, but I have received some facts from Mr. Gow which make me less confident of its single-broodedness. If it be single-brooded, then by destroying the bed and planting anew, you will have no difficulty in destroying them; but if it should prove two-brooded, it will be more difficult to destroy.

Mr. H. J. Dunlap—By plowing up our old beds, do you mean that they won't lay any eggs on the plants planted in April?

Mr. Riley—I do not mean that; but the beetles do not issue until late in June, therefore, by plowing under, you would not kill a single insect, but by destroying these plants by burning, you destroy all the insects that are in them; therefore you will have no borers in the new vines you plant. However, the beetles will fly in from the neighborhood, undoubtedly, and in the course of two years more, you may have to renew again. In that way, you will never suffer seriously, as you have heretofore done in some parts of this State.

Mr. Shepherd—I want a description of the animal.

Mr. Riley—It is a little curculio, somewhat smaller than the plum curculio, perfectly smooth, cylindrical in form, and marked with brown and yellowish-brown spots. It is figured in my third report, and is about two-thirds the size of the common curculio, but it is perfectly smooth, and marked as I have stated. It deposits its egg in the crown of the strawberry plant, and the larva enters the crown and goes to the root, and sometimes into the smaller roots.

Now, the facts that I would like are such as you could give me—that is, whether you have found the larva and the pupa all the year round, and whether you have ever noticed them in July, or in August, and whether you have noticed them in November and at the end of the year.

REPORT OF VICE-PRESIDENT FOR THE SEVENTH DISTRICT.

The Secretary next proceeded to read the report of Parker Earle, Vice-President for the Seventh District, which was as follows:

The degree of cold we suffered last winter has never been exceeded but once since the invasion of this district by the orchard planters. The average report of minimum temperature, at Cobden, was fourteen degrees below. Nine years before it went four degrees lower. At that time the damage to peach trees was considerable, but our orchards were all young and vigorous, being undebilitated by exhausting crops or unnatural

droughts. This year the apparent effect of the winter has been much greater; but we must remember the three preceding very dry years, and the two heavy, exhausting crops, the trees had borne. We had no peaches whatever for market at Cobden, Makanda, or Anna, or in any other section of the district, where peaches are planted largely for market, except at Villa Ridge, where a partial but very remunerative crop was marketed. I learn that the eastern portion of the district yielded some peaches, mostly seedlings; this was also true in portions of the Mississippi bottom. It is probable that the cold was materially less in the bottom than on the hills, which average some six hundred feet above it; and it is certain that trees there had been less exhausted by preceding crops and droughts. They had some fine specimens of Crawford's Early.

The destruction of our Hale's Early trees is very noteworthy; many blocks of them were found entirely dead this summer, and I judge all are much weakened that had borne crops. Whether any of our old peach orchards will ever recover their vigor and usefulness is a question which receives many doubtful answers. Good cultivation the past summer, following energetic spring pruning, has failed in most instances to produce the normal, luxuriant growth; young peach orchards, however, that have been well managed, look exceedingly well. It is, possibly, a good time now to plant peaches in all the hill country of Egypt.

Our apple crop has been very small in quantity and of unprecedented inferiority; an absolutely perfect apple has been a rare and remarkable sight. Our orchards have, however, escaped unusual injuries, and now, generally, seem full of promise.

The pear crop has been painfully light, and the fruit much injured by curculios and codling moths.

The berry crops were all lighter than ever before. The difficulty of establishing a strawberry field in those sections where they have been common (on account of the crown-borer) is, in many cases, apparently insurmountable. The area of land in that crop is now much less than formerly, and anybody who may be lucky enough to secure a large crop of strawberries, in Egypt, will be reasonably sure of a paying market for many years to come.

The difficulties to be met, in any branch of fruit culture, are vastly greater than they were ten years ago; and it seems inevitable that a majority who engage therein will fail to gain large profits. Yet never was there a better time, for men who can bring skill, thoroughness and unwearying energy to the work, to plant largely of our leading commercial fruits; and for this enterprise, I firmly believe, our Egyptian hills present unsurpassed invitations.

COBDEN, ILL., Dec. 6, 1873. PARKER EARLE.

FAILURE OF THE FRUIT CROP OF 1873.

This subject being next in order,

MR. DAGGY remarked—I will say it is because the trees were killed.

MR. FLAGG—I think the causes have been pretty well developed by the reports of the Vice-Presidents; but I suppose it will be well to bring

up a collateral question of the trees in grass, and the trees that are not. There was a very interesting report made to the Warsaw Horticultural Society, in relation to an apple orchard, part in blue grass and part not in blue grass. It was found in that case that the trees that grew in the blue grass were not killed, but came through in tolerably good condition, while those in cultivated ground were killed. The conclusion of the committee was that the blue grass was a protection, and they quoted Mr. Meehan's opinion that the earth under the blue grass sod was several degrees cooler than the sod where there was no grass. Then Mr. Bergmann states that he found, at Monence and elsewhere, that trees in grass were doing the best, and that in those cases the earth was several degrees cooler than where the earth was bare, or under cultivation. Now, has any gentleman here observed that fact—of trees in grass, and trees not in grass, and whether any more were killed in one case than in the other?

Mr. Galusha—If Mr. Hammond were here, he could explain this matter. I read the notice of the meeting at Warsaw. It was stated in that report, and in the discussion upon it, that the committee examined the trees that were killed, by digging down, and they found, on the south side of the tree, where the sun shone, the roots were dead, while on the north side they were not. They attributed the death of the trees to the fact that the soil was heated up and became too hot and dry during the last intensely hot summer, and thus prepared the way for the death of the trees during the succeeding extreme winter. In the blue grass, they also dug to the roots, and found them uninjured. Admitting this is a fact, yet we ought to be careful about laying so much stress on blue grass, because such a summer, succeeded by such a winter, might never occur again; and to put our orchards in grass, and get stunted trees, would be very bad policy, in my opinion.

Mr. Childs—I have some trees in my orchard that were surrounded with blue grass, and were not injured at all apparently. There are some that were plowed around that presented more indications of injury. This year I broke up some of the ground in order to destroy thistles, and the trees seemed to make very fair growth, for the season. Those that were in blue grass also made fair growth. I do not know whether the blue grass had any thing to do with the preserving of the trees or not, but these are the facts.

Mr. Minkler—The whole substance of the matter is summed up in this—*the excessive drought, and the dryness of the soil, after a heavy crop of*

fruit. The trees had exhausted all the moisture, and there was nothing to sustain them in the winter, and the excessive frost then coming on killed them. If there had been plenty of moisture stored up for the winter, it would have been better for them. Those that had borne the heaviest crops were most exhausted.

In the winters of 1855-6, we had a very severe winter, and many of our trees were killed. The cause of that was that the trees grew late in the fall, and the sudden change of climate killed them.

Mr. Nelson—Taking that as a fact, I would like to ask Mr. Minkler what caused the death of our trees in the nursery, that had not borne any fruit? They were not exhausted by a crop of fruit.

Mr. Minkler—One variety may have gone to rest early, and another variety may have held on growing until late. The Early Richmond went to rest early, and hence came through safe and sound; while other varieties, going to rest late, exhausted the moisture.

Mr. Nelson—I believe the Early Richmonds on the President's ground have been killed.

Mr. Minkler—That may all be because they exhausted the moisture by bearing a heavy crop.

The President—I had an orchard of about six hundred trees that bore a moderate crop last year, that were all killed; and about fifteen or twenty trees of the same age and the same year's planting, and three or four planted the year previous, that were mixed with evergreens, came through, and show well for a good crop of fruit for next year.

Mr. Schuyler—The trees that were cultivated made a much larger growth, and therefore would not endure as much cold weather as they otherwise would.

Mr. Wier—We are too apt to look at things superficially. In hot, dry seasons, our trees do not grow thriftily, and after them they are more liable to winter-killing, which we attribute to the severe drought. *Per se*, of course it is the primal cause, but the drought alone, unless much more severe than we have ever experienced, would not cause such disastrous results. We must bear in mind that our long, hot, dry summers, are very favorable to the generation of many minute noxious insects, particularly leaf-destroying ones, as well as other animal, sporadic and fungoid life, these preying upon the leaves at the most critical time, July and August, send the tree into the winter in a feeble, impoverished condition, particularly its roots. In such dry and hot seasons the leaves of our trees swarm with leaf-hoppers, leaf lice, (or *aphides*,) and very often with millions of leaf-feeding mites, or *acari*. I have seen a young nursery of

tens of thousands of apple trees without one perfect leaf on them during July and August, from punctures of leaf-hoppers, which puncture the leaves with their beaks, suck their vital juices, and by their wounds entirely destroy the digestive organs of the leaves. The *aphides* injured them in the same way. Of *acari*, or mites, that feed upon leaves, there appear to be hundreds of species, all closely allied to the so-called "red spider," so well known in green-houses; these appear to feed entirely upon the under cuticle of the leaves, which is, as is well known, the most vital part; they not only gnaw away and destroy the under portion of the leaves in patches, but appear to smother and destroy the rest by covering it with a thick spider-like web. These mites are almost microscopic in size, but as they swarm in countless millions, the effect of our *mite*-y dry summer on vegetation is appreciable. These noxious things not only do great damage themselves, but their wounds and punctures from *nidi*, for the spores of destructive fungi of various kinds; these, in these peculiar seasons, spread with the greatest rapidity, and quickly destroy any vitality that may be left in the foliage, and it falls to the ground leaving our fruit trees as we often see them, entirely bare of foliage early in August. What chance is there for such a tree, be it ever so hardy, to pass safely through our severe winters? Why should not such a tree be dead in its roots the next spring, even if there was no severe weather? To have good roots we must have mature, fully organized leaves to build them up—no leaves, no roots; weakened leaves, weak roots.

Besides the above there are many other leaf-destroyers that often breed to a very noxious extent in such seasons. I may mention the Apple leaf-folders and other small caterpillars.

Mr. Nelson—I have stated that the Early Richmond has been killed on the Morello stock; but for some neighborhoods, all that have been killed have been on the Mahaleb stock. I have taken cions off these tops, and they have grown. Now, that is a thing we want to hear about. All the cherry trees killed in my neighborhood have been on that stock. I lost not one single tree on a Morello stock. The Morello trees were discolored, but they have made a fair growth for old trees—I will say from six to ten inches. Old trees, of course, do not make as much as young ones.

Mr. Childs—In 1872, I set out several trees on the Mahaleb stock, and not a single one has been injured by the winter. They all grew through the winter, and came out last summer all right.

Mr. Mann—Speaking about these cherry trees, you will remember, Mr. President, that I got some from you on the Mahaleb stock, and

though I thought they would come out all right, there was scarcely a tree of them but what was killed, and I would like to know when they received their death.

Mr. Rice—I want to repeat one instance where trees, coming from the Dunlap stock, have come out perfectly sound. They are the Morello stock, and well grafted. Not a tree nor a limb has been killed in a whole orchard, but they have borne fairly this present season. I should like to know the reason of that lot living, and so many of Mr. Dunlap's dying.

Mr. Shepherd—I have a lot of 150 trees, planted three years ago. They had made good growth, and were planted, cared for, and protected as well as they could be in any place. Three-fourths of them were killed out dead. I have cherry trees thirty years of age that did not make much growth this season, but they escaped death, and bore fruit. Some of these trees were growing in open ground, and some in blue grass, and I had cherries on all of them, more or less. I would have supposed that if any cherry trees had been killed, they would have been, but they were not. Our Shepherd cherries came through with fruit enough to supply the birds until they were done. I got some from a graft set in a sucker, springing up from an Early Richmond. To be sure, that might not be injured. My old trees have all made sprouts, from ten to twenty inches, and look very well.

But to hear of the Morello perishing, root and branch, was a new thing to me, having planted them out for accommodation to others more than for use to myself, yet they are all killed.

As to apple trees being killed in blue grass and in open ground, I had none totally killed. Several put out a little germ of life, but I suppose they will make their final exit next spring. Some of these were in ground not covered by blue grass, and some on ground that was covered with it continuously. My old peach trees, that stood in the blue grass, were not killed—they are there yet; and some grafted trees that I had planted—may be twenty or thirty—some of them were killed on the outside, but not killed entirely.

Mr. Nelson to Mr. Galusha—Did you not get some Early Richmond from me, on a Morello stock, last spring? How did they do?

Mr. Galusha—I understand that they are dead, but have not seen them. I have Early Richmond trees of the same ages, cultivated on both Morello and Mahaleb stocks, and they all came out right. The trees were beautiful to behold; on the Mahaleb stock, this year, the foliage was luxuriant; and little cherry trees, on the Morello stock, that have

been planted four years, were perfectly loaded with fruit. I never saw a heavier crop of fruit in my life. I found, as far as stocks were concerned, no difference. With regard to pear trees, some trees which I thought were dead, and was about to dig them up, have recovered. We did dig up some peach trees, which I regretted very much, as those left standing are generally alive. Of the pear trees, only two died. Those that were quite discolored, even to the very skin—in these very same trees the color was restored partially, and I don't know but they are healthy now, and bid fair to be good healthy trees.

Mr. H. J. Dunlap—I have an orchard of six hundred and fifty Early Richmond cherry trees on Morello stocks, which are eight or nine years old, and have borne four or five good crops of fruit. It is wholly in blue grass, but in the east end of it, about two hundred and fifty trees are dead, but toward the west they gradually get better, and at the west end they bore a good crop of fruit. Of those that died, not only the stocks were killed, but the tops of the Early Richmond were killed. In addition to this I had, in the nursery, Early Richmond on Morello stock, three or four years' grafted, and they were all dead, so that at last we did not have a stock to set a graft on. I do not, however, think that the Morello stock was to blame for the death of the trees.

Now as to apple trees: In the same piece of ground I have an orchard consisting of about half a dozen of the most approved varieties; one is the Minkler, as hardy as a hog; yet out of one hundred and forty trees, I don't think there are ten of them left, and even these are badly diseased. If any one will tell me the reason of these trees dying, I shall be glad.

A Member—Which of those cherry trees in orchard were on the highest ground?

Mr. H. J. Dunlap—Well, sir, there was no difference; the ground drained to the south.

Mr. Wier—I understand most of these Early Richmonds that are reported killed are on Morello stocks, top-grafted. I examined a large amount of Early Richmond, top-grafted on Morello stocks, last spring, in a nursery on high prairie soil, and after a careful examination, both the proprietor and I concluded that one-third of them had the stock and roots entirely killed; another third, we thought, would survive if not transplanted; the remaining third, we thought, would do to transplant with safety. I have a cherry orchard of between three thousand and four thousand trees, top-worked with Early Richmond and English Morello, on their own and common Morello seedlings; these have been in orchard

six years, on most favorable soil. Of these seedlings about one-tenth were killed from under the trees. I have also seen, during the past summer, both on my own grounds and on the high prairies, thousands of Morello stocks, and Mahaleb stocks, in bud, in rows adjacent, with not one of the Mahaleb killed by the past winter, while from one half to all of the Morello stocks were killed, root and top. I have had eighteen years' experience with the Mahaleb as a stock, and during this period have never known a tree on it killed by severe cold, old or young, out of tens of thousands grown, handled and planted. The old trees even blossomed and bore fruit the past season, on my ground, on the most exposed situation. I *know* that on well drained, sandy loam, and on dry silicious clays, the Mahaleb, as a stock, is fully hardy; but am free to admit that on some soils it may not stand. I find that seedlings of the Morellos are many of them quite tender, fully as much or more so than Mazzard cherry seedlings. Now there are gentlemen here maintaining that suckers from the common Morello are fully hardy. May not this conflicting testimony all be explained, Mr. President, by the fact that, as I well know, some neighborhoods may have varieties of the common Morello that are hardy? We have three distinct varieties in my neighborhood, showing different degrees of ability to withstand cold.

Mr. Nelson—All the trees I had stood up very well last spring. I had heard about this matter of the Morello, and that was the reason I made inquiry. I have not heard of a dozen but what lived and did well, with the exception of these. It seems that in most neighborhoods they did not grow well, while in my neighborhood they have grown well. I have taken particular pains to inquire after the matter, and satisfy myself. They have done well, although they were discolored.

Mr. Mann—I have about 100 Early Richmond on Morello stocks—all of which gave me good crops last season. I did not see one of them that was injured by the winter. I had a few thousands of sapling Morellos, that were so badly injured that I plowed them up.

Mr. Dunning—I have had some experience with the Morello stocks, having many acres, from which I have raised fruit for market. In Cook county, there are many thousand acres covered with cherry trees. To be sure, there were some few died, but there were very few more Morellos died than there did last year. The old orchards produced more fruit than the younger ones, and some of them produced crops of as fine cherries as we ever marketed. We are looking to have a large crop the coming season.

In regard to Mahaleb stock, I have no experience, except with five trees. I am sorry to say I have never received fruit enough from them to pay the first cost.

We have never failed with the Early Richmond; once, in consequence of a violent storm, the crop was destroyed entirely. This last year there was about one-third of an average crop. It had been dry; then there came on a rain, and they burst.

MR. BOURLAND—Does the same state of facts hold good in other orchards?

MR. DUNNING—All kinds of fruit, as far as I know, were better than you had in this portion of the State. In our orchard, we had a fair crop of apples. Our pear crop was unusually good, and our small fruit was good. We had good crops in Du Page, McHenry and Cook counties.

MR. NELSON—Our apple crop was almost a total failure. The cherry crop was almost one-fourth in Will and the adjoining counties.

MR. WIER—I have been thinking this mystery might be explained in this way. I suppose we are all telling the exact truth about these different stocks. It may be owing to the different kinds of Morello stock we use. Now, I would ask Mr. Dunning if there is any difference in the stocks in his part of the State?

MR. DUNNING—What we have used have been what are called the Black Morello. We had some sent from Champaign last spring, and they were grafted, and there are more failures among them than anywhere else.

MR. WIER—You go around our town, and you will find that we have five or six different Morellos. They are seedlings that have been raised from Morello seeds.

We had last year about 250 selected Morello saplings that had been collected out of thousands, for grafting and pruning. About half of them were badly injured; one-quarter killed, root and branch, and the remainder were not injured a particle.

MR. NELSON—All I can say is that those I had killed were of all kinds.

MR. MONTGOMERY—It is a matter of wonder and astonishment to me, and I think it would be well to refer it to the same cause these other men did—to electricity or to atmospheric phenomena. I believe it is not a question of stocks at all. There are very singular results coming from the effect of the cold upon the cherry crop of last year.

Now, I had some Morellos that were top grafted, or budded; some of them failed, and some did not. Where they failed, in the same row there are Morellos living and doing well, that made good growth this year. Not far from them, I had a row of Mahaleb, of which there was not a twig killed in the whole lot. So that it must be in the location or situation, or it must be electricity or atmospheric influence.

Mr. Wier—Last summer, a year ago, I budded something like a thousand orchard trees—the Early Richmond—just put one bud in the leading shoot of the tree of the Shepherd cherry, and wrapped it with common bass matting. Last year, when I came to cut the graft back, I found about a quarter of them that did well, another quarter of them started very slowly, and others not all. Was it just that slight wound which caused the tree above to die, or was it the bass matting around it?

Mr. Riley—I will just give one or two facts. I think all these effects might be traced to their causes if we had a better knowledge of the facts. Broadly speaking, I think the meteorology of the last few years has had to do with it. But there are many other specific causes. For two or three years previously we had had excessive heat and drought; and notwithstanding we had abundance of rain last spring, yet it was so violent that it penetrated very little into the ground, and I could not find a particle of moisture three or four feet down; there was not a particle of life to the roots. Was it any wonder that many of the vines were dying? Here we have a beautiful illustration of this system of neglect in vine culture, that has been advised this year and last year. Many of our grapes showed neglect last year; and wherever the vineyards have been neglected the grounds have become baked, and the vines were all killed. This is one case in point, showing how very important it is that they should not be neglected.

Then there are the direct causes of failure in the drought, and in the excessive cold that succeeded it. The thermometer with us was 26° below zero, and yet I know peach orchards where there was scarcely a limb killed. That could be accounted for by the position of the orchard and condition of the soil. I think the excessive drought and the severe winter are the chief causes of the failure.

Mr. Greene—We have heard all sorts of experiences within the last few years—yes, within the last few months—in reference to this subject. It comes several months after the difficulties have been realized, and when the circumstances attending them are, to a certain extent, out of mind.

Now I want to suggest this as indicative of the advantages to flow from what I proposed earlier in the afternoon; we need to have these

circumstances and conditions reported at the time of their occurrence. They ought to be considered by some central head or committee, carefully, all the way through the season, and not let your reports extend over the whole year when they cover so much ground; get your reports week after week, and you can arrive at reasons for these conditions.

Mr. Flagg—I do not think there is any doubt as to what caused the death of these trees. I would like, however, to say a few words upon this point. It has happened to be my fortune to get hold of a number of facts dating as far back as three years. The idea I have is something like this: That the summer of 1870 had some very severe drought in it; that it was continued through the fall and through the winter, and, I believe, into the spring—an excessively severe condition of things. The summer of 1871 did not make up the deficiency of moisture, and the same thing was continued through the winter, and into the spring of 1872. We have had this condition of things more severe, relatively, South than North. Following up this great drought, and the second great bearing which left the trees in a very enfeebled condition, was the excessive cold of last winter. Through the line of Jacksonville and Decatur was the intensest cold in this State; and while it was a good deal warmer in the latitude of Alton and Cairo, yet it was colder than ever before.

Now what I want to insist upon is that the relative hardiness of Morello and Mahaleb stocks could not be decided by this test; both of them were swept off, to a great extent, and if either of them did escape it was owing to peculiar circumstances. And so in regard to our hardy apples—the Duchess of Oldenburg, and others of that kind. In Wisconsin it was claimed that they were less hardy than some other varieties.

Mr. Daggy—In the same locality I have had a little experience with the different stocks. Perhaps there is no actual test of the good qualities of one and the bad of the other; but the fact is that neither of them stood the severity of last winter and the preceding drought. I had them on their own roots—the Malaheb and the Morello—in bearing, all of which were killed. This is in the line of the suggestion of Mr. Flagg.

Mr. Wier—There is not a bit of doubt but that the Red Astrachans have been worse killed in my ground than the others; but we have to look at some other cause besides the winter for that, because they have stood 40° below zero in other places.

Mr. Rice—There appears to me another fact not yet stated: All our trees went into the winter in ripened condition, peaches and all, and they had an equal chance, consequently the peach trees stood the climate as well as our apples, which was never the case before.

Mr. Hay—I presume all of you have felt, in going across the street, a sudden change of the atmosphere; so in walking across a field, you find a difference between the air on the high land and in the hollows; these differences in atmosphere have a very marked influence.

Only last week, or the fore part of this week, I was digging a ditch, and found there was not a particle of moisture a foot and a half from the surface; I suppose the roots of trees in such earth must suffer from want of moisture.

Mr. Parks—I believe that if we could provide for the supply of evaporation, we should come nearer finding a remedy for the matter than in any other way, and if there could be any way devised for retaining the moisture in the ground, I believe it would help wonderfully; will not mulching do this?

Mr. Nelson—Up north we are all aware that peaches were generally killed, yet last year I had a row of two-year-old seedling peaches, and late in the fall I trenched on each side of the row, and took a large portion of the roots, for the purpose of grafting the Wild Goose plum on. At the end where we trenched, the trees are scarcely hurt a particle, while at the other end, that we did not trench, the trees were killed almost entirely to the ground.

Mr. Galusha—What time was this trenching done?

Mr. Nelson—It must have been about the last of October or first of November. Now I attribute the preservation of the trees to the fact that in digging that trench we stirred the ground, and that the loose soil thrown in the trench held moisture and saved those trees; while at the other end the ground was hard.

Mr. Minkler—Perhaps you had a shower, and the surface rain ran into that drainage.

Mr. Nelson—I think so. I had four thousand two-year-old apple trees, and they were all injured very badly. I wrote to several men to get their advice about the matter, and told them I had a notion to cut them off at the ground, and finally came to the conclusion that I would cut them off; which I did, at the collar, and there was not one in a thousand that sprouted, while the trees that I left, of the two-year-olds, have lived, made a nice growth, and are fine looking trees to-day.

Mr. Furness—I did not come from Indiana to teach you any thing about managing your trees on your prairies, but I came to learn from you. We suffer a little over in Central Indiana from this trouble, but not as much as you do; my position is rather elevated, and rather peculiarly situated

for that vicinity. Just a month ago a fruit-grower called at my place and I told him I was not materially injured. Says he: "How is that? My two-year-olds are killed, and I had to cut them back in order to get any kind of growth out of them. I consider myself damaged two thousand dollars on my small piece of ground." His apple orchard was about six years old, and was looking very well. I told him I had no difficulty about that. Then he said: "How far is it to water down here? What kind of a sub-soil have you?" I said: "At the bottom of my cellar I struck a bed of sand seventeen and one-half feet thick. Four to six feet below the surface there is a current of water." He said: "That is your immunity about this thing, for your trees can reach down to the water, and do very well, and have their sap flowing when the cold weather sets in."

Mr. McAfee—This subject is very interesting, but I think there is one branch of it which is neglected. If any force is brought to bear on any animal or plant that is against it in nature, that plant or animal, to resist to the best possible point, should have its full vigor, and its full powers of life and resistance; and if that plant is in any way weakened or enervated by any thing that has happened recently, it is incapable of undergoing this stress.

Now, look at our seasons for a few years past in Northern Illinois; we shall find that for three years past it has suffered from droughts, especially last fall, and especially during the latter part of the season, when the buds were being perfected, when the stores of plant nourishment were to be laid away, just at the time when the plant was in a flaccid, drooping, weakened condition. There was not water enough to make its leaves soft, and there were not juices sufficient to produce the starch which must be laid aside for plant food. Perennial plants lay away the food in late summer and fall to start in the spring; and if you cut them off early from all sources of nourishment, they will grow for a while in the spring, perhaps, but not long; they must have that food laid up. Trees in a condition described could not possibly store this food, as the osmos work, which is going on from cell to cell, if there was not turgidity enough in the plant, could not take place properly; the starch granules could not be born, and therefore the plant would die.

The roots were quite dry and solid until the frosts of winter came—there was not a particle of mud to impede the running of wagons in our section of the country. I believe right there lies the cause of the trouble last winter. It was a different thing to killing plants by excessive

freezing; 40° below might have killed them, when 28° would not; but 28°, when the plants were in such a condition, would be enough to kill them.

On motion of Mr. Huggins, an adjournment was then made until half past seven o'clock.

THIRD DAY.

EVENING SESSION.

The Society met at half past seven, pursuant to adjournment.

RESOLUTIONS ON REPORTING FACTS TO SECRETARY.

Mr. Greene—I have been requested to put in the form of resolutions the subject of the reporting presented this afternoon. Having consulted with the Secretary as to his doing the work, and having obtained his assent to it, I present the resolutions with a great deal more confidence than I otherwise would.

In presenting these resolutions, just allow me to say one word. I know the value of time. It is that knowledge which prompts me to urge this matter with more energy than I otherwise would. We have spent two or three hours this afternoon in relating experiences which were very interesting; but supposing we had simple facts from each orchardist in this State, which had been classified, would we not have a basis to operate upon? And would not our opinions have been founded on facts, which would have given us something to rest upon hereafter?

We all know that ever since navigation has been engaged in, every shipmaster has kept a log-book, in which he has noted every sounding, every throwing of the log, every storm—all the facts connected with the voyage. But it was not until the Congress at Brussels that the abstracts of these logs were sent to one headquarters, and we got the practical use of them. But since that day, we have a whole system of ocean currents, and voyages are shortened days; we have the saving of millions to the industries of the country. We have observations enough, but as long as we observe as individuals, they amount to but little; but as soon as we

throw them together, we shall have something more definite than we now have, and more scientific, too.

The question being on the adoption of the preamble and resolution, they were adopted unanimously. They were as follows:

WHEREAS—The Secretary of this Society expresses his willingness to receive, digest, and classify any facts which may be furnished him by the horticulturists of the State, as presenting the circumstances under which any disease may have affected, insects ravaged, or death destroyed, either fruits, trees, or plants; therefore,

Resolved, That it is the duty, and should be the pleasure of every member of this Society, and of every other individual horticulturist in the State, to report promptly to the Secretary of the Illinois State Horticultural Society all the information which will contribute to an understanding of the *causes* which have produced such effects as enumerated in the foregoing preamble; *Provided*, always, that personal opinions and theories shall in no case be given; but simply and undeniable facts alone shall be reported.

REPORTS OF SPECIAL COMMITTEES.

The President called for reports from special committees, which were presented as follows:

REPORT OF COMMITTEE ON FRUITS.

Your committee find one fine collection of apples on exhibition, consisting of fifty-six varieties, exhibited by Mr. B. O. Curtis, of Edgar county. The specimens are remarkably fair, considering the adverse character of the season. The collection embraces several new varieties, but probably none to which it is necessary to call special attention. Many of the specimens are of large size. One remarkably large Pound Pear in the collection weighs one and a half pounds.

Mr. P. Snedecker exhibits several remarkably fine specimens of Pound Pear.

WM. H. MANN,
T. McWHORTER,
S. G. MINKLER,
Committee.

REPORT OF AUDITING COMMITTEE.

Your auditing committee would respectfully report that we have examined the reports of the Secretary and Treasurer, and vouchers accompanying them, and find them correct.

Respectfully submitted,

E. DAGGY,
W. T. NELSON,
ISAAC SNEDECKER,
Auditing Committee.

REPORT ON COLLECTIONS OF INSECTS.

Report of committee on prizes, offered by this Society to the students of the Illinois Industrial University, for best and second best collections of insects shown at the present meeting of this Society. The

resolution offering these prizes, adopted at the last annual meeting, is as follows:

Resolved, That this Society offer to the students of the State Industrial University, two prizes; one of ten dollars, and one of five dollars, for the best and second best collections of insects—to be exhibited at the annual meeting in Champaign, in December, 1873—each collection to be accompanied by a paper on some species of insects, injurious or beneficial.

Your committee have found no difficulty in deciding who were entitled to the prizes offered. We found many beautiful collections of insects, showing that many of the students had taken great interest in the study of entomology, both practical and scientific; but in some instances the collections show plainly that they were made as a mere matter of recreation or pastime; these, as well as some others, showing plainly that the collectors did not understand or appreciate the reason for offering these prizes, to-wit: the promotion of practical and scientific entomology, and a love for the study of natural history generally.

Your committee are unanimous in awarding the first prize to P. Gennardius, a native of Greece, a student in the University, and also a close student of nature. This collection is very extensive for the time taken in making it; the specimens are well mounted, scientifically classified in their proper orders and families, and, for the most part, correctly named. The paper presented by this competitor we think worthy of consideration by this Society, and a credit to its author; and would recommend its publication in its transactions, as we feel that this Society should do all it can to encourage Mr. Gennardius in his investigations in this branch of natural history. It should first be revised by some competent entomologist, and we recommend its return to Mr. G. to be corrected in some important points, by the aid of proper advice, and forwarded to our Secretary in time for publication.

Collection by Walter E. Knibloe.—To this we would award the second prize. In this collection we find an artificial arrangement of species; that is, they are not properly classified, and this should not be encouraged in any student in entomology. The specimens had been nicely handled and mounted, making very pretty office, or even parlor ornaments, and were, for the most part, correctly named. The paper accompanying this collection is very faulty, both scientifically and practically.

Several other collections shown were nicely mounted, but artificially and fancifully arranged, nearly all of them being of no scientific interest, though very pretty ornaments.

Your committee would say to these several collectors, that the purely ornamental arrangement of insects, though a very pleasant pastime, perhaps, and not entirely to be discouraged, yet we think the time of the students in our Industrial University can be more profitably expended in a thoroughly scientific classification of insects, as far as they go, and a thorough study of their habits.

D. B. WIER,
JONA. HUGGINS, } *Committee.*
E. DAGGY.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Your committee heartily concur in asking for a law providing that all fruits be sold by weight, instead of by the *box*, which means something of the size of a piece of chalk. And while not fully sympathizing with the alarmists in their gloomy forebodings for the future on account of the destruction of our forests, we would respectfully call the attention of the people to the clause in this address relating to the planting of trees for the farm and other purposes.

And we also heartily concur in the feeling that the "new management of the Industrial University calls for our earnest sympathies," and we fully believe that the Illinois State Horticultural Society *will* encourage its endeavors to be of practical value to the great interest of horticulture.

All of which is respectfully submitted.

L. C. FRANCIS,
A. A. HILLIARD, } *Committee.*
S. G. MINKLER,

DISCUSSION ON SMALL FRUITS.

BLACKBERRIES.

MR. GALUSHA—I presume most of you have had experience, and those who have not would be glad to get information as to whether the Kittatinny blackberry is hardy and reliable for a crop. We have dropped the Lawton and Wilson to plant the Kittatinny. I have two or three acres of it, but I must say I have never had a full crop of berries from it yet, owing to injury by the winter. This season a very few shoots from very low down, produced fruit, but nothing to be called a crop at all. Last year perhaps fifty or sixty bushes were loaded, while all the others had less than half a crop. If it does not do better, after trying it another year, I shall root it out. I know it to be hardier than the Lawton or Wilson, but it does not produce well with me, so far.

MR. FLAGG—It has, with us, been pronounced a success. They all prefer it to any other blackberry they have tried. This year it bore a small crop of fruit, and neither the Lawton, nor the Wilson, nor the wild blackberry, did any thing.

MR. GALUSHA—The berry is very much superior to others for family use; when you can get it it is delicious.

MR. SCOFIELD—Last winter my plants were killed to the ground, and the roots were black so that I thought they never would sprout; but they did, though. If you plant them once you will never need to plant them again. I have a row of Lawton that has not failed to bear for the last five

years. The Kittatinny which I planted two years ago bore a very light crop last year.

Have any of you known the Ancient Briton? I have two plants which friend Stickney sent me from Wisconsin, and last year they succeeded in getting above the ground about four feet, and produced two or three quarts to a plant. They are perfectly hardy, and the best producers I have ever had on my place. The berry is not quite as large as the Kittatinny; the cane is green and remains green.

Mr. Foster—There is a variety in Iowa of some reputation, called the Bernard. I know the man who brought it from Ohio some years ago. When he first found it he was going to see his sweetheart, and some fine blackberries, that, attracting his attention, he marked the spot, and ultimately got some plants from there. It is a very good fruit for northern latitudes.

Mr. Nelson—I have had the Lawton blackberry for several years. I have a plant or two of the Ancient Briton, which I got from Mr. Douglas, some two or three years since, but they do not seem to bear. The Kittatinny has done well with me the past season, and I am sure if it were killed down to the ground every five years it would pay well.

Mr. Scofield—Can you get any berries without taking the suckers off?

Mr. Nelson—The suckers I sell for plants.

Mr. Daggy—I reported rather favorably upon the Kittatinny some few years ago; but I had not then as much experience as I have had since. Whilst I think it hardier than the Lawton, I do not consider it a success. I think the drought has had something to do with it. I have tried also Wilson's and Needham's Newton White, and I would say, if you have not them, never get them; you had better have the Canada thistle. The Kittatinny is nearly as bad in the line of sprouts; but if the sprouts could be sold for plants, as Mr. Nelson does, they might be profitable.

Mr. Montgomery—I think it is a decided success. I agree with Mr. Nelson, and would not be inclined to give it away. I have not many plants to sell; but I think there is no fruit that has yielded as much clear money in our neighborhood as the Kittatinny blackberry has in Mattoon. The berries are good—we think better than the Lawton.

Mr. Daggy—I might be misunderstood. I prefer the Kittatinny to any other, but yet it does not fill the bill as a reliable blackberry.

Mr. Wier—I have had it in fruit. I think I had the first that came into this State, and this has been my first failure of a full crop. If it failed

every other year, it would still be among the most profitable of small fruits. Still, I have no doubt there are locations where the Kittatinny will not succeed. It wants a light soil—a high, dry soil, without manure, and to be thoroughly cut back during the season, but never cut an inch after the leaves fall.

There are other blackberries that are perfectly hardy. Needham's White is perfectly hardy on the soils where I have it, yet it is not worthy of cultivation, only for amateurs. The suckers of the Kittatinny must be treated as weeds, while young.

RASPBERRIES.

Mr. McAfee—The tree cricket is playing havoc with the raspberry in our section of the country. It is boring the canes from one end to the other, and filling them up with eggs. It is boring them three times as much as ever it did before.

Mr. Wier—I wish to say a word about the Philadelphia berry. I think I have proved that there are two varieties—one very desirable, and one very undesirable; but I do not know that I could explain it so that members would understand the difference, nor do I know where they would get the plants, to a certainty. The more desirable variety is a much stronger plant than the other, and much more productive, and hardier. My impression is, that there are just about half of each all over the country, and that is the reason it has been considered worthless by many, and thought so highly of by others.

Mr. Galusha—It was explained last winter, but I think it will bear repeating; for I regard the Philadelphia to be at the head of the list, for profit. The spurious variety has smaller and rounder berries, and the seeds are larger, and separate so easily that they fall to pieces in picking. So you may know them by that. The genuine Philadelphia is quite firm. I discovered the difference the very first year mine bore, and I commenced exterminating these spurious bushes. My plants were procured from J. H. Stewart, of Quincy—the first he ever sold, perhaps. I found, even this year, some of the spurious ones left, but very few. You should, in picking, watch your berries closely, and if you find any bushes bearing these spurious ones, root them out and kill them. I regard the Philadelphia as the most profitable variety I have ever grown.

Mr. Scofield—Are the canes of both the same in color?

Mr. Galusha—I have not noticed any difference; the habits of growth are the same; the rough and large foliage the same.

I will place next to it the McCormick, which has been sent out by Mr. Purdy as the mammoth cluster. It is a week later than the Doolittle, will produce a third more than that variety, and is a somewhat larger, better market berry.

The Turner raspberry, of which I planted a thousand, in the spring of 1872, is a most delicious fruit. It endured the winter about the same as Philadelphia, and bore a fair crop this year. The berry is as large as the Philadalphia, but not as firm; hence, I think not as good for market. It is a most inveterate sprouter—as bad as any of the blackberries—yet I don't regard this habit of throwing up suckers as a very serious objection, for the young suckers are so easily destroyed by the plow and hoe. Fully half of my plants failed to live when planted, and my men have given the plantation such good cultivation this year that I have not half enough suckers to fill the vacancies. From the limited experience I have had with this variety, I am inclined to think it is one of *the very best* to raise for family use; but, of course, *the suckers must be treated as weeds—destroyed.*

Mr. Nelson—After hearing Mr. Galusha's description of the spurious Philadelphias, I can understand why I have not appreciated this variety, which is so highly praised—I have had the spurious kind—little bits of berries, which would fall to pieces in picking.

I have grown the Turner, and I think a great deal of it, after a trial of two or three years. It is certainly the finest berry when packed. I took half a dozen or dozen boxes to town one day, with some other fruit, and a dealer said to me: "How much do you ask for those beautiful berries?" I said: "Well, twenty-five or thirty cents a quart." He said: "I will take them." They sprout a great deal, but the sprouts are easily killed. The longer I have this berry, the more I think of it. Each year it increases in bearing. The largest crop of berries that I ever had of any kind, according to the number of plants, has been of this Turner.

I got a little idea about training them from a gentleman in Odell. His plan was to gather up four or five canes, and tie them together with twine, about three feet high, and cut them off about an inch above the twine; and treated this way, are the prettiest sight you ever saw; they stand there, loaded with fruit from the ground up, and look very beautiful indeed. Last year I tied a few by way of experiment, and it seems to me that those I tied up bore a great many more berries than the others.

Mr. Galusha—I see Mr. Baldwin before us. He sent this variety out, and has given it to us at a moderate price—so different in that

respect to some others—and I would like to hear what he has say about it.

Mr. Baldwin—I have no ax to grind in the Turner, only as regards the fruit. I suspect I have made more money from that fruit than any other man in the State has from any other single fruit. I have fourteen acres of it. I got, originally, a dozen plants, seedlings, raised by Prof. Turner, and found three varieties among them. I believe Mr. Hay and I discovered about twelve varieties in another place. I propogated my stock from one plant. I tried to put it on the market, but it had been sold mixed, as it was before. I kept out of the market some years, but at last the *Prairie Farmer* brought it into notice, and I had to put it into market, which I did, at thirty dollars a thousand. The last two years I have had plenty of plants, but the first year I had not. Now as to sprouting: the suckers are easily destroyed—but you must keep your hoes away from it or you cannot do any good.

I plant it in rows eight feet apart; I did plant four feet apart in the rows, but now I plant a continuous row, and so I do with all the raspberries that I grow. I make a hedge of them, and if the frost kills part of them, I have part left.

Mr. Hay—I know that Mr. Baldwin gets from five to seven cents a quart more for that Turner raspberry than any one gets for other kinds of raspberries, and I know he gets fruit later than any one else.

Mr. Nelson—Have you ever tried tying them up?

Mr. Baldwin—When I first began I took the English plan, and that is to bend them over between the spaces. That leaves the fruit to itself, and the hills to grow the canes in by themselves, which is a very good plan for an amateur, but it did not do for me very long, because it is too much work. The Turner is strong enough to stand of itself. I pick out the old wood, if I have time; I have not done it this year, but I see the advantage of doing it, and it can be done at any time during the winter; we have done some already, and we do it at our leisure. I cut them about one third-back; the canes bend a little, and I cut them at that bend, and they support themselves and stand up. In the hedge row system they support one another more than they do in hills. The color of the berry is a bright scarlet, and sells well. I sold from six hundred to eight hundred quarts this year in Jacksonville, where I live.

Mr. Flagg—What is the yield of this raspberry per acre?

Mr. Baldwin—I have not figured very close on them since the first. Mr. Hay will recollect it, perhaps. We have in our neighborhood a

people called Portuguese, and the women folks picked them for me at two cents per quart in the beginning, and the price advances after the best of the picking is done. I pay them so that they can get good wages, and I have paid them as much as ten cents. I have those of all ages at work—from old women with spectacles down to little girls; they average about seventy-five cents to one dollar a day by picking.

Mr. Bourland—I have one patch of it, and had to dig up and throw away the bushes, but I suppose it was from the unfortunate position of my patch. I do not like to throw cold water upon what other people praise, but I have found it to be a poor bearer, and not hardy in our situation; and to be so enormously productive of suckers as to be a nuisance to the ground. That is in Peoria. The Philadelphia I have found very satisfactory. My opinion is that mine is the genuine variety; I got it from a neighbor, and I think he got it from Mr. Baldwin.

There is a berry discovered in our neighborhood, and cultivated by Mr. Littlefield with great success, which I consider superior to the Doolittle or Mammoth Cluster, both in size and quality; it is unquestionably a distinct variety.

Mr. Scofield—Is the Turner hardy in the northern part of the State?

Mr. Nelson—It is so in Will county, where I live.

Mr. Scofield—As far as I am concerned, I am satisfied with the Philadelphia. I have found it hardy, very productive, and not much given to sprouting.

Mr. Galusha—I would like to call attention to the Clark raspberry, for the reason that it is still advertised as a superior berry, and immensely productive. I had an acre of plants of this variety three or four years, and found it as "productive" of *suckers* as the Turner, but not productive of berries in any remunerating degree. The berry is very sweet and rich, but with a peculiar aroma, that is disagreeable to almost every one, after eating a few of them; and it is too soft to carry to market in good condition. I have plowed up my plants, and put McCormick and Philadelphia upon the ground. I wish to throw out a thought here in regard to these very rich berries. I find that in my own family, and those of my friends, that the richest berries do not, as a general rule, prove the most satisfactory, for the reason that a very few satisfy the appetite, especially if having an unpleasant aroma; whereas the human system requires a considerable amount of fruits, and those, too, having some acidity, so that in the long run those varieties that have a pleasant, brisk flavor—not too rich, and with some acidity—give the best satisfaction.

In reply to Mr. Scofield's question, I will say that I find the Turner about as hardy as the Philadelphia. It was injured somewhat last winter, and some canes killed, as there were of the Philadelphia. I would ask as to the pruning of the raspberry—what time is it best to prune? My own success has been varied.

MR. MAHAN—I would just like to state the experience of the growers in Southern Illinois on that point. The plan I have acted on is this: Immediately after the fruit is taken off the old canes, as the new shoots get up above the old ones, they should be cut off, or pinched off with the fingers. If neglected until a foot above the tops of the old canes, they may be cut off with a common corn-cutter. The stems then throw out lateral shoots all the way from near the ground up; and in the following spring, these laterals should be shortened in, according to their number, to within four to twelve inches from the main stem. The bushes will then stand up like small trees, and be covered with leaves and fruit upon all sides. The canes should be cut down to two and a half feet high as soon as the fruit is off. The Doolittle and McCormick (or Miami) will stand up without pruning.

MR. MCAFEE—The gentleman's plan is excellent; except in one respect. He speaks about doing that in the summer. If you don't do it before the 10th of June, in our county, you will get no fruit. They should be pinched off when they are a foot high, and not longer; and if you do that, they will stretch up and get about two feet, and the laterals will be from the ground up; and if you cut off one of these tops that have been so pinched, you will find that the pith is very small, that there is a good head, and that the cane will stand of itself.

If you want to have a fancy black cap berry, that will sell for a high price and get a big crop of mammoth canes, treat them in that way, and cut them off about three inches from the ground, and you will get lateral shoots from these canes that will furnish you with masses and clusters of raspberries larger than you can think of. If I were going to raise berries for market, I think I should do that for the purpose of obtaining a fancy article.

MR. SCOFIELD—I think a mean between two extremes is best; when you cut down to a foot, you are too close, and when you say two and a half feet, you are too long.

MR. BALDWIN—I would like to know whether it makes any difference between the frost cutting down the plants and doing it yourself.

MR. HAY—My experience is the same as Mr. McAfee's. They are not so liable to be injured by the frost when they are pinched back short

as mentioned. I pinched back about a hundred and fifty plants, and the next summer I picked about thirteen bushels of the finest fruit you ever saw.

MISCELLANEOUS BUSINESS.

Mr. Flagg—I move that when we adjourn to-night it shall be *sine die*.

The Secretary, in behalf of the Regent and faculty of the Industrial University, presented an invitation to members to visit the school and the farms of that institution the next day. He thought that such members as could possibly spare the day for this purpose would be well repaid for doing so: they would go home with definite ideas as to what the institution is doing for the sons and daughters of the industrial classes of the State, and more than ever determine to sustain it in its work.

The motion of Mr. Flagg was put to vote, and carried.

Prof. Burrill and a student of the University made some very pleasing statements in relation to its condition and work.

Mr. Hay mentioned some changes in railroad time.

Mr. Daggy—In making the report of auditing committee, it did not occur to the members of that committee that it was necessary to do more than report that we found the accounts and vouchers correct; but, upon second thought I discover that it is necessary that a vote be taken, either by the Society or the Executive Board, ordering a warrant drawn on the Treasurer, for the amount found due the Secretary. Our report states that we found due him the amount of fifty-seven dollars and nine cents; and, as the Society has voted him, in addition to his salary, one hundred dollars—the amount of premium from State fair—I move that a warrant be drawn on the Treasurer, in favor of O. B. Galusha, for one hundred and seven dollars and nine cents, being the entire amount due him to this date.

The motion prevailed unanimously.

DISCUSSION RESUMED.

Dr. Furness—I told you a little while ago I did not belong to your State, therefore my experience may not be valuable to you. I have been trying the Herstine raspberry, and find it is one of the largest bearers I ever tried in my life; grown within two rods of the Philadelphia; it equals that variety in productiveness. The color and size of berries are very similar to the Philadelphia. In hardiness I have not sufficiently tested it, but it was somewhat injured last winter. For a large sized berry I have never seen its equal. I have only tried it last year and this. The plants

I got, after coming a long distance, bore larger berries the same year than I ever had before; they bore so much that they somewhat exhausted the plants, and the canes were not worth much this year. It is one of those sprouting canes like the Philadelphia, but not a serious sprouter like the Clark. The other varieties I have not tested.

CURRANTS.

A brief discussion of currants ensued, in which Messrs. McAfee, Scofield and Nelson took part; but nothing new or important was developed.

FINAL RESOLUTIONS.

Mr. Flagg, of the committee on final resolutions, presented a report which was concurred in, and the following resolutions were unanimously adopted:

Resolved, That the thanks of this Society are hereby returned to the Champaign Horticultural Society for its courtesy and attention to the members of this body; to the Illinois Central, the Indianapolis, Bloomington and Western, and to the Chicago & Alton railways, for returning members at reduced rates; to the hotels of Champaign or reduced bills; to the citizens of Champaign and Urbana for their generous hospitality; to the members of the press for the extensive circulation they have given to the proceedings of this meeting, and to A. M. Garland, Secretary of the State Board of Agriculture, for his generous donation of the Transactions of the Board for the use of our members.

Resolved, That the *rural* felicity with which our presiding officer has performed the duties of his office, and the bland and exemplary conduct of our Secretary, are deserving of our thanks and commendation, and that they are hereby heartily extended.

Resolved, That we gladly welcome to our meeting the presence and counsel of our friends from Indiana, Missouri and Iowa, and trust we shall be able to reciprocate and repay their neighborly kindness.

Resolved, That notwithstanding the drawbacks of nature, and the lack of drawbacks or rebates on the part of railways the past season, we shall not despair, but will go forward to plant trees, and to do our own work of making more fruitful and flowry the great State of Illinois.

Resolved, That we look with fear upon the disastrous results to cherry and railroad stocks, from drought on one hand and water on the other; and learn with alarm from the report of our State Entomologist, that the "potato bugs" are marching on Washington.

On motion of Mr. Nelson, the Society then adjourned.

LECTURE ON ENTOMOLOGY.

BY PROF. C. V. RILEY, STATE ENTOMOLOGIST OF MISSOURI.

The following lecture was delivered before the Society on the evening of the second day of the meeting, but a copy of it was not furnished the Secretary in time for insertion in its proper place:

Ladies and Gentlemen: It gives me pleasure to speak again to my horticultural friends in Illinois, to enjoy anew their dearly-prized company. Your Corresponding Secretary invited me to lecture before you. I have had no time to prepare any thing worthy to be called a lecture, but I will endeavor to entertain you in a very informal way. I may state, by way of prelude, that questions do not in the least annoy or disconcert me, and I shall be glad to answer any that may be asked.

My text will be, two of our insects, which are very important—one, the codling moth, which has been frequently treated of and discussed at the gatherings of this Society; the other, the grape phylloxera, which is not so well understood by the members of this Society.

Eight years ago, I wrote my maiden essay for this Society, on the codling moth. It was read by that veteran horticulturist who has been carrying on his investigations this last summer in Germany and Austria—and whose presence we all miss here to night—Dr. Waters. To the kind approval which that essay met, I owe no little of that enthusiasm which has, since that time, sustained me in my efforts to unlock nature's secrets. I am proud to say that there was not a single fault of commission in that article; but since then we have learned much that was then unknown about this codling moth.

I will present to you the more important facts; I cannot give you a full account. It would occupy more time than we shall have to-night.

First—This codling moth is an imported insect. There was a time when it had no existence in this land, and it furnishes us with an excellent illustration of the importance of preventing the importation of noxious insects. If we had had the knowledge we now have, we might easily have prevented its introduction, thus saving the immense loss which it has caused. The mellowing and vivifying influence of the vernal year causes our codling moth to burst the silken cerements which had held and enwrapped it during its long winter torpor and sleep. After meeting her mate, the female flits from tree to tree, and deposits her eggs in the calyx of the new-formed fruit.

I have here a sketch showing the different stages through which it goes. In a few days, this egg produces an insect which makes for the heart of the young fruit. There it riots around the core, causing perforations and excavations filled with its own excrement. It takes about twenty or thirty days to attain its full growth. It has then changed color, and the head and cervical

shield, which were formerly black, have become brown. This larva now issues from the fruit. It generally leaves the fruit during the night, either by letting itself down by a silken web, or by crawling down the trunk of the tree—about half get to the ground one way, and half the other. Its object in descending the tree is to find some sheltered spot in which to spin its cocoon. Having found this place, it begins to spin its cocoon, which it always covers on the outside with the particles of the bark of the tree. The normal spinning place is under the loose scales of bark of the tree, so that it is very difficult to find it. Within this cocoon the larva changes to a chrysalis. This stage lasts about twelve days, during which time it remains without food or motion. It then works its way partly out of the cocoon by these spines [illustrating] and gives forth the moth.

At first, the wings are damp. You can see them expand, or grow. They are little pads when they first come out of the chrysalis, but in the course of ten minutes, they are fully expanded.

This moth is inconspicuous, because it is entirely nocturnal in its habits. It is brown—has two large spots near the tips of the wings, of brown, and of metallic luster, and is very pretty.

In this manner the transformations of this little moth are gone through—those transformations which, from time immemorial, have been looked upon as emblematic of man's immortality—the groveling worm representing our earthly condition. There are two broods each year. This was long suspected by us in the West, but eastern authors had not regarded it so, and I had the honor of demonstrating it. The larvæ of the first brood frequently co-exist with those of the second—thus the later individuals of the first brood will be frequently found in the same apples as the earlier individuals of the second.

Now let us make a few practical suggestions: First, I will refer to the direct killing of the insect. We can take advantage of the larvæ habit. You are all, as members of this Society, conversant with the different kinds of bandages that have been employed for this purpose. The main point I wish to convey is, that whatever bandage is placed around the tree, it should be placed on the tree by the first of June, in this latitude; or it may be delayed a little, in the more northern parts of the State, with impunity; but it is safe to have them on by that time. They should be examined six or seven weeks after the blossoms fall from the tree. Dr. LeBaron gives seven weeks for the northern part of the State, after the blossoms have fallen; and, for the latitude of St. Louis, I would say six weeks. They should then be examined four times, at intervals of ten days, and once after the apples are all taken off the tree.

Now with regard to the best bandage: as Mr. Wier is present it will be best for me to read what I have said about the best kind of bandage in my last report:

"WIER'S APPLE-WORM TRAP.

"Fully resolved to test this trap thoroughly, in comparison with other methods of allurement, I commenced (having, of course, purchased

the right to use!) as early as the first of May to prepare a number of trees as follows: 1st. With Wier's trap screwed on in different positions—some trees having single traps, either on the north, south, east or west sides, and placed at different heights from the ground, and some having as many as three traps; 2d. Strips of old sacks, four inches wide, and lined on one side with pieces of lath tacked on transversely, and at such distance from each other that, when brought around the tree, they formed an almost complete wooden ring; 3d. Bandages of various kinds of rag; 4th. Hay ropes; 5th. Paper bandages, made of the cheapest kind of straw paper, folded several times, and in widths varying from three to six inches. In order to insure the utmost accuracy, these several traps were regularly examined every twelve days throughout the season, and a careful account kept of the worms or chrysalides found under each; and where it was a question as to the comparative merits of the different traps, they were placed on trees of the same variety. The results of these experiments—not to waste space with the detailed array of figures—may be thus summed up.

No apple worms were found until the 14th of June, and, though many other insects had previously taken advantage of the shelter, *not a single plum curculio was found.* While, therefore, there is no harm in having the bandages on as early as recommended last year, in ordinary seasons, little, if any thing, will be lost by waiting till the first of June. Where three of the Wier traps were on the same tree, I obtained more worms than where there was but one; and where there was but one, there was no difference in favor of position, as regards direction or altitude—taking the season through. The lathed canvas encircling the tree secured, on an average, five times as many worms as any single Wier trap. The rag, paper and hay bandages allured almost as many, and either kind more than the single Wier trap.

I hope, therefore, that the patentees have already realized the anticipated fortune from their invention; for while I should be sorry to injure their chances in the least, truth compels me to state that, after a year's trial, I am not quite as favorably impressed with the usefulness of this shingle-trap as I was before trial, and am more thoroughly confirmed in the opinion expressed last year that, 'notwithstanding all the theories of my friend Wier, it must always be inferior to any trap that encircles the tree.' I do not wish to detract from its merits one jot, and where old shingles are abundant and other material scarce, the former will still prove valuable for the reasons given a year ago; and Mr. Wier would deserve our thanks for showing us how to use them, did he not persist in claiming too much for them, and in making us pay for their use.

"Time, expense and efficiency considered, and so far as one year's comparison will warrant conclusions, I place the different materials enumerated in the following order of merit:

"1.—Paper bandages. Common straw wrapping paper, 18x30, can be bought for sixty cents per bundle. Each bundle contains two hundred and forty sheets, and each sheet folded lengthwise thrice upon itself, will

give us eight layers, between two and three inches wide, and be of sufficient length to encircle most ordinary trees. It is easily drawn around the tree and fastened with a tack, and so cheap that when the time comes to destroy the worms, the bandages containing them may be detached, piled in a heap and burned, and new ones attached in their places. If eight bandages are used to each tree during the season, the cost will be just two cents per tree; and the owner could well afford to treble the number of sheets, and keep three on each tree, either together or in different places.

"2.—Rags. These have very much the same effect as paper, but are more costly and difficult to get of the requisite length. Where they can be had cheaply, they may be detached from the tree and scalded with their contents.

"3. The Wier trap, used as recommended last year, is, perhaps, the next most useful; but both cost and time required to destroy the worms are greater than in the first two methods.

"4. The lath-belt is the very best of all traps, as far as efficiency goes; but it is placed fourth on the list, because of the greater cost and trouble of making. On the same kinds of tree, (Early Harvest), and in the same orchard, I have taken, with this belt, between June 15th and July 1st, as many as sixty-eight, and ninety-nine larvæ and pupæ, against fourteen and twenty in the single Wier trap.

"5.—Hay-bands, on account of their greater inconvenience, I place last.

"The experiments were mostly made in a large and rather neglected orchard, belonging to Mrs. Spencer Smith.

"All these methods are good, and the orchardist will be guided in his choice by individual circumstances."

I should state here, by way of parenthesis, that all these bandages are most effectual on young and smooth trees; because, on older ones, where the bark is rough, a great many worms spin up before they leave the tree, and before reaching the bandages, and others spin up below the bandages, hence the importance of scraping. We see here again how perfectly absurd is the claim that all the worms will be attracted to a single one of the Wier traps. They will be attracted to the most cosy place of shelter, whether that be afforded by the bark of the tree, by the Wier trap, or by any other trap.

We can also do much by destroying the worms before they leave the fruit. It has generally been recommended to pick up all the apples, or cause them to be devoured by hogs or sheep, but many varieties of the apple trees do not drop their fruit until after this worm has issued. Now here is a problem for our Agricultural College students to work at. The absence of the worm is generally known by a mass of frass on the outside of the apple. Now, it would be futile to go to a great deal of expense, when the worm had left before the fruit fell from the tree.

With regard to pears, I have been informed by Parker Earle that the worm invariably leaves before the fruit falls from the tree.

Another method is to use a hook at the end of a pole, as suggested by Dr. Le Baron. I mention these little facts because they may not occur to many of you, and I know many of you may profit by them.

There are many indirect ways of fighting this insect—first of all, by encouraging its parasites. I have discovered that two parasites prey upon the codling moth. Some of the college students before me may want to know what I mean by parasites. If I told you of a bug that deposited its eggs on the bodies of sheep or other animals; that that egg hatched out into a serpent, which fed and flourished in the fatty portion of the sheep, without injuring it, for a time, apparently; that on the contrary, the sheep so infested would be able to live without food, whereas without the parasite it would die; that after a time the serpent ate its way through the sheep, burrowed into the ground, and after remaining there an indefinite time, would struggle through the earth and issue as a bird, like its parent, the story would appear ridiculous. Yet it is hardly more wonderful than the actual facts of parasitic insect life.

But I will illustrate the parasitic theory of the insect world by showing you the tomato worm.

[Here the lecturer illustrated, at some length, the curiosities of parasitism by means of drawings on the blackboard, which cannot be produced here.]

In referring to the common tomato worm, he remarked:

There is a peculiar little microgaster, a little fly that comes along and invariably settles on the back or head of the worm, knowing very well that it cannot there be injured. It punctures the skin of that worm and inserts an egg, or perhaps forty or fifty. The maggots hatched from these eggs feed on that worm—which in time becomes sickly, until at last the little parasites are fully grown, and then they spin cocoons on the back of the worm, from which, eventually, little black flies, like the parent, issue. Now, this is primary parasitism; but there are secondary, tertiary and even quaternary parasites. And so it is, in the language of Swift:

> "So naturalists observe a flea,
> Has smaller fleas that on him prey;
> And these have smaller still to bite 'em,
> And so proceed, *ad infinitum*."

We frequently have no less than four distinct parasites feeding on one another, and all of them on a vegetable feeder.

MR. GALUSHA—Is it invariably the case that parasites are much less in size than those upon which they prey?

MR. RILEY—True parasites, as distinguished from cannibals, invariably and necessarily are. I have mentioned two parasites on this apple worm. I will try to describe one: it is the *macrocentrus delicatus*. This fly punctures the worm while yet in the heart of the apple, and spins its cocoon inside the cocoon of the apple worm. This is a yellow fly; the other is a black fly, *pimpla annulipes*. Instead of destroying it before it has assumed the chrysalis state, it does not destroy it until after.

Besides these, I know that two cannibal beetles—the Pennsylvania soldier beetle, and the two-lined soldier beetle, as well as the ants and cockroaches, destroy it as it leaves the fruit. Then there is a species of *trogosita* which Dr. LeBaron and I have found in the bandages, destroying the worm. I mention this to show that it has its enemies notwithstanding that it lives in the center of the apple, and descends from the tree at night.

With regard to liquids or lights, I will simply say they are of no practical use. Both modes kill as many of the enemies of the codling moth as of the codling moth itself.

A few words as to its food plants: The apple is essentially its food plant, but in late years I have seen it in pears, plums and peaches, and it breeds in wild crabs. From these facts we see how foolish is the suggestion of Dr. J. S. Parker, of Ithaca, New York, to exterminate the codling moth by ceasing to grow apples for one or more years. It would thereby simply be forced to breed in other fruits.

MR. BARLER—At what time is the egg deposited?

MR. RILEY—Just about the time the blossoms are falling and the fruit is forming.

I should have stated the difference between the first and second broods. In the first brood the egg state lasts about ten days, the larva state about thirty days, the chrysalis state twelve to fourteen days.

The second brood, however, remains in the larva state all through the winter, no matter whether it leaves the fruit in August or November. This fact I first recorded in this country, not knowing that the same fact had been recorded by a French author in 1850.

Another point that I have not mentioned, and among others which I have not had time to mention, is the necessity for destroying these winter cocoons in our cellars and storehouses. The necessity of destroying them becomes apparent, because we keep them out of the way of the natural enemy that would otherwise devour them.

A MEMBER—Could you find them in an apple barrel that was hooped up?

MR. RILEY—Yes, sir; under the hoops—great numbers of them.

A MEMBER—Did I understand you to say it was purely nocturnal?

MR. RILEY—It might fly, to endeavor to escape, in the day, but it is essentially a nocturnal insect. I have found the moth at rest in the day-time under the bark, and I have found it in the house. Even in confinement it rests during the day, and becomes active during the night.

A MEMBER—Are they not attracted by light?

MR. RILEY—Very slightly, indeed. If you have a light in the orchard, and some way to secure them, you will find a few of them among hundreds of other species.

MR. HUGGINS—I had apples in my cellar, in which there were two windows. I moved these apples, and put in a stove, and I was quite surprised to find, in the middle of the day, a number of these codling moths active and trying to get out. I would like that fact explained.

Mr. Riley—It was quite warm enough for them to fly, and they tried to get to the light because they imagined the window a hole of escape. Though the moth is nocturnal, it can nevertheless discriminate between light and dark. Following its natural instincts, it wants to get to the orchard. It does not understand that there is a window there, or glass. That is the reason that it beats upon the glass.

A Member—Do not codling moths fly around our lamps in the evening?

Mr. Riley—The codling moth is very rarely found around our lamps. I have tried it, and even where insects pattered on my windows and got into the room, making a noise like a hailstorm, I would very rarely find codling moths among them, though I knew they were abundant—there were apple trees infested by them, not two rods away.

Mr. Burrill—Is it known whether they eat any thing?

Mr. Riley—The moth has a short tongue, and may feed to a slight extent on liquid sweets; but that it is attracted by sweets I do not think. But certain kinds of beetles which prey upon it are so attracted.

To give you briefly a summary: The codling worm is an imported insect. Place no confidence in the light and bottle systems, but rely on bandages; have your bandages on by the first of June; examine them six weeks after the blossom falls, and then four times subsequently, at intervals of ten days, and then once when the fruit is gathered; be sure to destroy the cocoons in storehouse; and, lastly, encourage winter birds.

THE GRAPE PHYLLOXERA.

This is an insect attracting much attention just now, and which holds a prominent place in entomological literature. To many, the name is void of meaning. It is a term derived from the Greek, meaning "withered leaf," and used to designate a peculiar species of plant louse. First it was applied to a species which causes a withered appearance of the leaves of the oak in Europe.

Our grape-vine species has acquired such prominence that the generic term has come to be used in a broader sense, so as to indicate both the insect and the disease it produces.

The first published reference to this insect was made about the year 1856 by the State Entomologist of New York. Dr. Fitch knew so little of the insect, as we understand it, that he not only referred it to the wrong genus, but he did not perfectly describe it.

The next reference to it was by myself, in 1866. Then it was treated of by Dr. Walsh, and by Dr. Shimer, of Mount Carroll. These authors referred to the gall-making insect, and our friend, Dr. Le Baron, shows by his last article on the subject that he does. Even Mr. A. S. Fuller, of New Jersey, whose vines have suffered from its injuries, and on whose place I spent some time last fall, examining the louse, in the last article in which he has referred to this subject, goes on to say that the insect causes a stoppage of sap in the roots by a deposition of its eggs, which is wide of the mark. It is by the puncture of the louse for food that the

damage is done. There was no end to the surmises as to the cause of the disease in France, until Prof. J. E. Planchon announced that it was owing to the puncture of this phylloxera.

In 1869, M. J. Lichtenstein, of France, suggested that the European phylloxera was the same as our gall insect. In 1870 I visited France, and studied this insect in the field, and in 1871 I was able to give proof of the identity of the two insects. In my third, fourth, and fifth reports, where these facts are given at length and in detail, I have shown that the failure of the European vine, and the partial failure of many hybrids, are owing to the injurious work of this insidious little louse. It had been at its destructive work for years, and produced injuries to the vines, the nature of which was not known until the appearance of my fourth report.

This article attracted great attention, because in it I demonstrated the above-named facts, and urged the use of stocks as a means of supplying the place of the blighted vineyards of southern France. During this time the disease was still raging in France. The plague had spread in France, Italy, and Germany, and also in England, among the hot-house grapes.

Last fall, Prof. Planchon spent a month in this country, and all my previous conclusions were verified by what he found here. First of all, we have on the leaves of some of our varieties of vines, especially on those belonging to the *Riparia*, a gall or excrescence on the under side of the leaf, which sometimes covers the leaf, as is shown in the illustration. (See Fig. 1.) If we examine them, we shall find that there are a great number of pale yellow eggs in each, with a dark yellow mother-louse. Sometimes you will find not less than a thousand of these eggs in a single gall. Every one of these produces a louse. (See Fig. 2.) Each one of these lice is a female, and is capable of forming new galls by puncturing the leaf with its proboscis. The young louse crawls and forms a new gall without impregnation. It increases until it becomes like its mother in size, and is soon surrounded by five or six hundred or a thousand eggs. Now, if from a single mother-louse a thousand eggs are obtained, in five generations the number of lice will foot up one thousand billions of individuals; and we can form some conception of this immense number when we reflect that, small as the

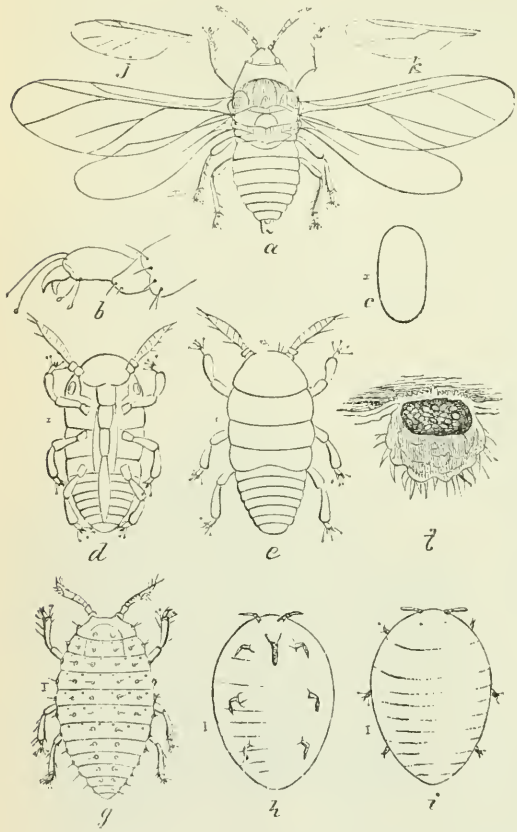
FIG. 1.

LEAF SHOWING GALLS.

insect is, if placed head to tail, they would absolutely make a line 300,000,000 miles long, and, if placed in close compact over a superficial area, cover 102 square miles. This will give some explanation of the rapid spread of this disease in Europe.

This gall form is but a transient form. Three or four years ago it was most abundant, especially on the Clinton; last year it was more on the Taylor and the Delaware than on the Clinton. This year it has scarcely been seen. As I said, it is only a transient form, the true being the root form or *radicicolosa*. (See Figure 3.)

FIG. 2.



EXPLANATION OF FIG. 2. —*a*, winged female; *b*, her foot or tarsus—after Signoret; *c*, an enlarged egg, *d*, the newly hatched gall-inhabiting form, ventral view; *e*, same, dorsal view; *f*, a section of a gall; *g*, the tubercled root-inhabiting form; *h*, the mother gall-louse, at the height of her fertility, ventral view; *i*, same, dorsal view—all from nature; *j* and *k*, differently veined wings of the oak *phylloxera*, of Europe. All these figures are greatly enlarged, and the natural size is approximately shown by hair lines.

On the roots they collect in little companies, and cause, by their punctures, not galls, but swellings of the roots, (as seen at *b*, figure 3.)

The moment the lice have done their work and begin to leave, these swellings will shrink up, and the roots decay and fall off. So it is with

the large roots, and the lice we find on the roots are always tuberculous. The gall-inhabiting form exists only in the wingless female sex; but on the roots, about as early as the first of July, you will find winged individuals appearing. This root form presents us with individuals of both sexes. In the male the body is shorter than in the female. In July, and all along after then, they are becoming winged insects.

These insects spread over the ground—wingless and winged—they also crawl along the roots under ground. The winged female is always burdened with from three to five eggs. These few eggs are probably deposited in the fuzzy matter of the vine.

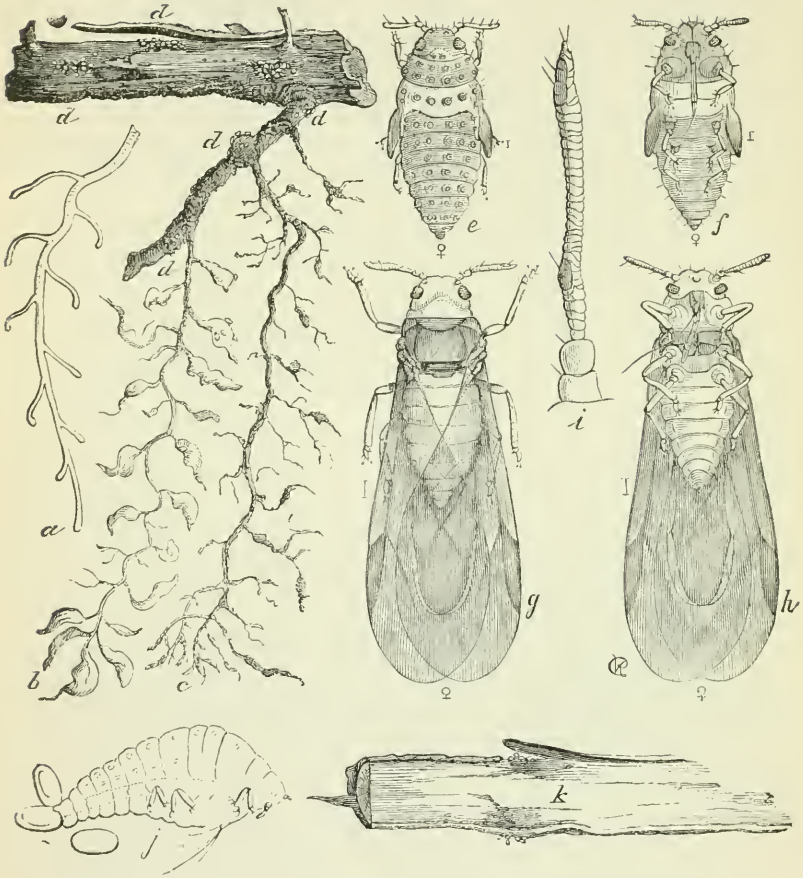
So that you see the insect can be transported either in new vines or on cuttings. This will explain how it was first introduced into France, some ten years ago, or perhaps longer. The winged insect also flies, and deposits eggs in neighboring vineyards.

Now for the remedies. To destroy the gall form we would have to simply pluck and destroy the leaves, and thus get rid of it; but it is different with the insect in the ground, which is not so easily reached. While they are on the small roots the evidence of their work is less conspicuous, but as the roots waste away the symptoms become more acute, and at this stage of the disease the lice have generally left. A small number of root lice produce no serious effects on the vine; it is only when they are very numerous, and cause not only the fibrous roots, but even the large roots, to waste away, that the disease becomes serious.

As a remedial or preventive measure, I have urged grafting of the more tender varieties on roots of those that are stronger. Most of our native varieties are strong, as you know, and the tougher-rooted varieties resist the puncture of the louse more than the others do.

I notice in your last report a great deal said about the death of vines, but not a word about the work of this insect. The weakness of the Catawba, and the weakness and failure of European varieties, are spoken of, but not attributed to the right cause, which is the *Phylloxera*.

FIG. 3.



EXPLANATION OF FIG. 3.—*a*, shows a healthy root; *b*, one on which the lice are working, representing the knots and swellings caused by their punctures; *c*, a root that has been deserted by them, and where the rootlets have commenced to decay; *d*, *d*, *d*, shows how the lice are found on the larger roots; *e*, female pupa, dorsal view; *f*, same, ventral view; *g*, winged female, dorsal view; *h*, same, ventral view; *i*, greatly magnified antenna of winged insect; *j*, side view of the wingless female, laying eggs on roots; *k*, shows how the punctures of the lice cause the larger roots to rot.

To conclude: We have had an insect on our American continent, which I have been able to trace as far back as 1834, in San Antonio, Texas, and also in 1845, gathered in Kansas. The efforts to cultivate the European vine have failed of success.

Unnoticed and unseen, our microscopic louse is at work. It exists in two distinct forms, as I have described it. The gall form was long known to do considerable damage to certain kinds of vine, through their foliage. The root form was never suspected until I discovered it. It was imported into England and France in 1863, but did not attract attention until 1868. The lack of their natural parasites, of which there are quite a number, the different mode of culture, the greater tenderness of the European vines, made the mortality very great.

This insect, therefore, is an American insect; but it was studied in foreign lands before its existence in its native country was suspected.

The Franco-Prussian war has terminated, and the indemnity has been paid in so short a time as to excite our wonder and surprise; and yet this little *Phylloxera* continues its devastations, and costs unfortunate France million of francs annually. The last German soldier has been removed—at a terrible cost it is true—but the *Phylloxera* remains, and if they could, at the same price, rid La Belle France of it, the riddance would be cheaply bought. If the government of France had known of the danger in importing our vines, without examining them, as it now understands it, this plague might have been kept out of her vineyards.

So it is with all insects; they are small objects, it is true. As you look at these insects (on the diagrams) they appear large, but the louse itself *can only be seen by the miscroscope*, though its work may be noticed by the naked eye. It was described by Dr. Fitch, who never thought that it existed in the roots of grape-vines.

During this time, a serious disease of the grape-vine developed in France, and the Minister of Agriculture offered a prize of 20,000 francs for the discovery of a remedy, and a special commission was appointed to attend to the matter.

The disease is in the form of little cankerous spots, which cause the spots to rot. You may imagine how little the true nature of this disease is understood, when I say that notwithstanding all that has been written for the last three years, thousands and thousands of francs have been spent in France to find a remedy. I am happy to say that we have now what we think is a remedy—this is the Bisulphide of Carbon. This remedy, so far, has proved effectual in killing the lice. It is a very volatile liquid, and is put in three or four holes around the vine. These holes are stopped up rapidly, and the vapor from it carbonizes the insect, and does not hurt the vine.

Mr. Barler—How about a direct application?

Mr. Riley—There have been all sorts used, but none so effectual as this last one which I have mentioned.

Mr. Barler—Is there any danger of mistaking these galls for any other?

Mr. Riley—None.

Mr. McAfee—How far does the generation of young lice from unimpregnated females go?

Mr. Riley—We know that they multiply organically for a series of generations, but in the end, the male element is sure to come in.

Mr. Furness—Has it any similarity to the louse on the apple tree roots?

Mr. Riley—There is great similarity of habit.

Mr. Wier—What is Bisulphide of Carbon, and where can it be had?

Mr. Riley—Any wholesale druggist or chemist can supply it.

A Member—Suppose we laid the roots quite bare, and then spread some Paris green on them, would that have any effect?

Mr. Riley—It would not be practicable, and I will tell you why. I have found them three feet below the surface, and where the fibrous roots go they will be found. The next best thing was carbolic acid, and submersion. Then any substance spread on the ground when the insects are traveling would kill a great many, but it would not kill all. You want a remedy that will kill all the lice, or they will soon be just as numerous as ever.

Mr. Barler—What is their size?

Mr. Riley—About the 1-100th or 2-100ths part of an inch. They are big enough to be seen, because they are of a bright yellow color; but the eggs, which are in clusters, are more easily seen than the lice.

Mr. Greene—Has it increased in the extent of its depredations on the vineyards?

Mr. Riley—I believe not. I believe it has been killing the vines, and they have been dying from it for many years. We have nothing to fear from it here. It will enable us to understand the failures that have occurred in the past, and induce us to examine both vines and roots.

Trichina Spiralis has caused many a death which we attributed to something else. We now know when a patient does die from Trichina Spiralis. We may prevent the disease of these vines, now that we know the cause.

A Member—Why is it more destructive in France than here?

Mr. Riley—Because they lack the natural parasites which we have here, to keep it in check; and secondly, their vines are more tender in character than ours; thirdly, because their vines have not been accustomed to the disease. Diseases which, among civilized communities, have prevailed many centuries, and become innocuous, when brought among other

peoples hitherto uncontaminated, become very fearful in their ravages. Our own vines are those which have best resisted the attacks of the louse in the past. Those which now are living are the very ones which have best resisted it.

Mr. Wier—I feel called upon to say a few words, as my name has been mentioned, though it is not me. Many of you know that there is a very large family of Wiers. The man that invented the apple worm trap is a cousin of mine, and I got into it because I could not help myself. I advised him not to take out a patent, but he insisted on doing it; and wanted me to help him, and, as a relative and friend, I did my best.

Now, there is something in that pamphlet, which Professor Riley has read, which I wish to modify. All my experiments were carried on in the summer of 1870, and very carefully noted. I did not take into consideration, fully, the season. In putting traps on the trees, I found that in putting them on the south side we caught no worms—that, I satisfied myself of, fully. I experimented by puttiug different traps on different sides of the trees, near the branches, and near the ground, and in every conceivable way for a period of three months. I say now, that I made some mistakes, but I found that I could catch no more worms in three traps than I could in one. There was another thing to be taken into consideration there—all the trees were young—bearing the first crop of fruit, and there was no rough bark on them. The trap was the only place the insect could find; it found that trap, even if there was only one. I think it would be very different on large, old trees, that had rough bark on.

There is another point I want to mention. I do not know what Mr. Thomas Wier will eventually do with this patent. Every device for doing that with two or more pieces of wood is covered by that patent. I wrote the specification myself, and know it; but I do not know what will be done with the patent—I do not think there will ever be any thing done. I believe that way of arranging the trap, by opening, as we arranged it, is the easiest way, and the speediest way of catching the codling moth, while I am not intending to deny what Mr. Riley has said—that one trap is incapable of catching all the worms.

There are some points about the codling moth on which I can hardly agree with him. Although his facts, as he has put them, could hardly be questioned, yet they are not entirely conclusive on some points. I have seen it flying in the middle of the day through apple trees; but only on one occasion have I seen it when the sun was just setting, and I never could find any flying, when the first group of eggs would be laid, later

than nine o'clock at night. I think, as a rule, that the moth is nocturnal. The case mentioned by Mr. Huggins is easily explained. Take male and female, and put them in a bottle, and after copulation the female will try to get out and lay its eggs, and I suppose they would continue to do so until dead.

There was a point made by Mr. Riley which I wish to notice; he was asked whether all parasites are not smaller than the insects upon which they feed. There are some that are not much different in size from those on which they feed.

Mr. Riley—When I speak of largeness I speak of bulk. Of course an insect might be much longer than another, and yet so small as not to weigh half as much as the one on which it fed. It is a very simple problem that no parasite can be as large as its prey, or it could not exist. The largest I know of is *ophion macrurum*, first obtained from the timber-belt of our worthy President. This completely fills the cocoon of the moth, and there is so little of the parasited worm left, that there is only the shrunken skin, and sometimes barely that. But the most effectual are those that are small.

MISCELLANEOUS PAPERS.

CONTRIBUTED BY MEMBERS OF THE SOCIETY FOR PUBLICATION.

METEOROLOGY.

BY PROF. J. B. TURNER, OF JACKSONVILLE, ILL.

Probably but very few will contend that we as yet have any practical science of Meteorology. But, so far as I am aware, nearly all that has been done to reduce this subject to practice, has been done by our own countrymen. Professor Loomis has made a general exhibition of most of its known isolated facts; Mr. Butler has given us one or two more practical books on the subject; while Prof. Maury, in my humble judgment, has pointed out to us and to the world, the only way in which it will be possible for us, even to make out any thing that even looks like a true science of Meteorology. Our corps of observers have made out regular reports of the indications of the thermometer, barometer, rain gauge, etc., etc., which have evolved items of interest respecting our own continent, sufficient at least to confirm the hope that a science of Meteorology is at last both practical, and, to the commercial, agricultural and sea-faring world, in the highest degree useful. The only new work from abroad, of a practical kind, of which I have any notice, is Camille Flamarion's treatise on the atmosphere.

Outside of these, and kindred laudable efforts, the current heirloom signs or symbols of Indians, trappers, sailors and farmers, are still the best indications of the course of the seasons we as yet have.

In a former paper, read before the Industrial University, in Champaign, and published in their last report, I endeavored to show the real coincidence of many of these popular signs or symbols, when truly interpreted with all our assumed and well known scientific facts; and also suggested one or two additional signs of the weather.

In that paper I attempted to go over so much ground, in so brief a space, that it was hardly possible that it should not have been, at various points, more or less misunderstood and misapplied by the reader. I will select one or two points as an illustration both of the liability of misapprehension and misapplication of principles in such cases, and to show what we now most need to do to correct all such errors both of belief and of practice.

The tendency of the double tidal atmospheric wave and wake of the sun and the moon when they run wide apart in their course through the heavens, to produce, by the excessive agitation of the air, more rain, all

other things being equal, than when they run one after the other in the same general wake, is symbolized, in popular meteorological mythology, (which is better and more truthful after all than most other forms of mythology,) by the different positions of the horns of the moon. Myriads of men in all races have observed the truth of this sign, in fact without having the power of even suspecting its true philosophy and cause. But still if any one should assume that in this given county or State, or country, any particular drought, however appalling, would be broken up by any such changes in the relative position of the sun and moon, he would assume what is wholly illogical, and might not prove true in any single case, or in any series of single cases; while still it might be true that, taking the whole circuit of the globe in our latitude, more rain does always and uniformly fall under the one condition of these heavenly bodies than under the other; and therefore that in general, on the great scale, there is always everywhere more prospect and more rational hope of rain under the one condition than under the other. For nothing is better known than that our rains do not spread themselves in a uniform belt, like a universal fog, over the whole circuit of the globe in a given latitude, but that they fall in condensed masses and showers and local storms, here and there; even more likely, for some reason, to wholly skip and pass over places of excessive drought than those of excessive inundation. The scientific or other observation of single countries, therefore, can effect nothing whatever in determining the existence or non-existence of such a cause; for the cause itself, in its own nature, affects simultaneously and alike the whole circuit of the globe, in the latitudes over which these atmospheric wakes may chance to lie.

We see, therefore, that nothing less than Prof. Maury's plan of observation, around the whole circuit at one and the same time, by the union and co-operation of all nations, can do any thing whatever toward philosophically determining this single point, or any other practical point of like nature. For all such purposes, our observations are utterly worthless till we make their circuit complete. They determine nothing whatever, in all such regards, however accurate or useful in other respects.

Take another instance: Nothing is more certain to my mind, than that the general dryness of the fall months, and consequent retained heat of wide areas of earth, is one of the primal causes which determine the general course of our winter winds, and therefore the temperature of our winters. It must be so, inevitably, unless our ultimate assumptions in all material philosophy are themselves utterly baseless.

I do not affirm that it is the sole cause, for I do not believe that it is; nor yet that it is the primal cause; for I do not yet fully know even that; although I think that it is. Now this one simple cause has been symbolized for ages in the same popular mythology of the weather, by the height of the beaver dams, and houses; the thickness or thinness of husks and shucks on corn and vegetable products; of feathers on water-fowls, etc., etc., all of which depend primarily on the condition of the water-fall and consequent heat and dryness, or wet and cold of the earth, in the closing months of the year. But if a man should reason from the

conditions of drought or wet, in his own little county, or State alone, he would reason from a basis quite too narrow, to become a determining cause, in any of those great processes, that extend round the entire globe, as he will most readily see, by simply looking on the map of the world, and observing how very small, and insignificant a part, of the vast whole, his own little county or State, or in fact the whole United States, really is. Amid influences so far-reaching and vast, a mere local cause is like a stone dropped in mid-ocean; it indeed produces its true effect in its circling waves, but they are soon obliterated and swallowed up in the vast power of the boundless impulses that conflict with them. Since the delivering of that lecture, I have been exceedingly gratified to notice that this subject has also arrested the attention of our Meteorological department at Washington, and that it is announced in the papers that Commodore Myers has already ordered a regular report of the depth of our rivers, as the most feasible way of determining the general condition of the soil of our continent, and of estimating its reserved force of retained summer heat; and from that obtaining a probable forecast of the severity of our winters. I need not say to nurserymen or farmers, of what vast value this one single item would be to them, in mere dollars and cents, could it be achieved: but here, again, we need to know, not simply the actual condition of our own continent, but also the relative condition of the continents east of us, before either our analysis or our conclusions can be said to be complete. Meantime we must keep our eyes and ears open, look at the facts and causes as widely as we can, and make the best guess at their results that we can; and here as elsewhere we shall do better to use our reason some, or as far as we can, with what few data we can get, than we shall not to use it at all, even though we may often fail, from the narrowness of our view. The two or three past years seem to many to be exceptions to the general law or rule of mild winters after wet falls on the wide scale. In one sense they have been signal exceptions, and in another not at all.

In this single State, and somewhat around it, we have had falls of extreme drought, while all around us they had the opposite of extreme wet. Last winter an unusual polar wave, or dip as it has been sometimes called, or cold atmospheric wave, early in the season swept over the whole country, and buried our narrow dry belt with the rest, wholly beneath the snow, thus making its retained heat, for the time being, as wholly inoperative as though it did not exist. But toward spring, after the snow had melted away, and even while it was melting away, any one could perceive the proper normal effects of the reserved heat, on our comparatively narrow, and therefore, on the wide scale, impotent drought belt; for we were plowing and planting here, over the region of this narrow drought belt, while the ground of the wetter regions, east and west and north of us, was still covered with snow; and thus, although our little narrow drought belt was wholly impotent, and far enough from giving to the whole West a mild winter, still, it did what it could for us who lived directly upon it. It gave us a much earlier warmth, though

attended with extreme rains in the spring, than others had who lived under the regions of heavy fall rains.

In each year it has demonstrated its power in one way or another, in proportion to its extent, even though leaving us for the long periods it remained covered with snow, and therefore powerless, to the very extreme cold produced by the wider wet areas which surrounded us. I can not doubt that the relatively retained heat of the various portions of our earth is the prime cause that determines the general course and drift of our winds, and consequently the general peculiarity of our seasons; while this general result is again greatly modified in given localities, by the general course and character of the storms which such currents create and set in motion. Neither of these efficient causes can be philosophically resolved without accurate, simultaneous observations and reports, all around the globe. I call reiterated attention to the above and similar signs, because so long as we, in fact, have no pretense even to a science which any practical man can handle for any of his uses, if each one of us observes for himself, and does the best he can with the few materials we do have, we shall, as individuals, both benefit ourselves and help forward real science better than in any other way within our present reach.

I have a few words to say about our present methods of scientific investigation, applicable to all possible science, and especially to all sciences, so called, still in embryo, and not yet into the grizzle, like meteorology.

All true philosophy or science whatever is simply the application of universal common sense to the known facts and relations of the physical world around us, and every such general fact or relation we, by a figure of speech, call a law. While faith or religion is the application of the same universal common sense, to the known or revealed facts and relations of the moral and spiritual world within, around and above us; and every general fact, or relation, or rule, in these great moral and spiritual interests of the race, we also call law, in a more literal sense, and with less of figure of speech.

In both cases alike, whether in physical philosophy and science, or in spiritual faith and morals, the true starting points and the method is precisely the same. Well known and admitted facts, in both cases alike, either natural and physical, or moral and spiritual, are the only possible basis or starting points; and the universal common sense of the race is the only instrument, or faculty, or power, by use of which these facts can be so put together and set in order as to exhibit to our minds what we call LAW, either physical or moral. Hence isolated facts, however numerous, can never in any case constitute a science, in the higher sense of that word, till the common sense of the race can perceive and accept them, all in well-defined groups, marching onward under the order of some general *law*, or in their true universal relations to each other. Hence we see the prime importance of everywhere alike collecting facts as a first step —facts of all sorts—both facts as isolated and facts as mere signs, or symbols, or as mere universal or general attendants on other facts. For

example, the appearance of daylight every morning is no more an unfailing fact than it is an unceasing sign or symbol of the coming sunrise. A peculiar sky, and wind and temperature, are no more certain co-existing facts than they are general, even though not unfailing signs, or tokens, or symbols of coming wind or rain. So in our spiritual and moral relations. When a man purposely cheats you, or lies to you once, it is a pretty heavy sign that he will do it again if he can get a chance, though not a certain one. Now in meteorology, and in all other human interests not yet reduced to absolute law and science proper, common sense impels us not only to notice the facts themselves, as facts, but also to take careful note of their general surroundings, or of what those facts signify to us as signs or symbols of those attendant or coming surroundings. Indeed, all possible natural philosophy is, in one aspect of the case, nothing but a true observation of facts as signs, or the making of one fact or relation a sign or symbol of an immensely wide group of attendant or similar facts and relations. Thus we use the back-bone of animals as the sign or symbol of a great group, which we call vertebrated animals; the web foot of the duck as the symbol of the swimmers; or the long legs of the crane as that of the waders, and so on. We group all the totally unknown and even undefinable and inconceivable causes of motion together, and call them FORCE or FORCES, of which, and of the presence of which, motion of all sorts is the only symbol, sign and proof. So on all subjects, he that notes things, more clearly seen and known as the true signs or symbols of what is otherwise unknown, or less clearly known, is the only true philosopher in all interests alike. But pre-eminently is this so in a new science like that of meteorology; and in all these observations plain common sense is not only the best human faculty, but the only one, on which any sort of reliance can be placed. Most true, it should be common sense, duly informed and drilled, and disciplined, and competent to its work. As when we speak of any thing as the work of human hands, we mean hands developed and disciplined by use, not hands dwarfed and crippled and paralyzed by utter disuse. Shall I fly off in a tangent here to harangue you anew on the absolute necessity of the proper drill and discipline of our Industrial University, and other schools, to all our interests alike?—or shall I spare you this infliction, and leave you to judge for yourselves? I will for once spare you; you cannot help judging right.

I make the above remarks to show that horticulturists have all the natural faculties of observing these facts and signs in meteorology that any men have or can have. Reading one single book like that of Butler would put them into the habit of observing them daily, and give them the right general method of observation, while the whole process would enlarge their minds, daily sharpen their intellectual powers, and aid, in the only way they can now aid, in the advance of that needful science—giving them from time to time many most useful hints and aids in the successful conduct of their daily business. Nor ought they to be laughed out of such observations by mere scientific pedants, who imagine that long strings of mere facts and figures alone can make a science, however accurately obtained and noted. Who does not know that nothing in this wide

world can even begin to lie like facts, and figures, and scripture, when you can but once contrive to get them at it? Their general reputation for veracity relieves them of all suspicion; and yet they have been uniformly placed at the very bottom of all the grandest schemes of folly and villainy the world has ever seen. This leads me to note some of the defects in our scientific observation of facts in meteorology, so far forth as our horticultural and agricultural interests are concerned; and first in regard to the rain gauge. It is self-evident that, for our puropses, it may be wholly immaterial what particular amount of rain may fall in any given year or season or month, unless we also know its distribution in respect to time. For all our purposes, the years or seasons of the very heaviest rain-falls, as a whole, by the rain gauge, may be our seasons of most destructive droughts, and *vice versa*.

For example, about the fourth of July last, we had here in Jacksonville thirteen inches of rain-fall, by the rain guage, in a single night. This beat down the ground almost as hard as a brick. Then came on a drought of two months, in which there was not for once enough rain to wet through the hard, beaten, and suddenly dried and baked crust of the earth.

The result was our potato and similar crops were utterly destroyed; and the corn crop diminished nearly one-half by drought; although that one single shower of rain, if well distributed in time, would have been amply sufficient for crops of all sorts for a whole three months, and would have carried one corn crop safely through, even its whole period of growth, from planting to gathering. Probably from twelve to twenty inches of rain, well distributed, would give us all the water in a year any of our crops ever need; while all great deluges which count up on the scale of the rain gauge only make matters worse, and all the more, leave our crops to perish with drought. After all, much of the co-called philosophical reasoning, from such mere statistical data of the rain gauge, is totally sophistical and fallacious. The same remarks of course apply in principle to the records of the thermometer, barometer, hydrometer, etc., etc. Like scripture texts, it depends wholly upon who uses them, and the use made of them, whether the records tell us any truth or not.

Our means of observing the courses of the winds are evidently wholly incomplete and unsatisfactory. We are observing the stream of air as it runs over its rough, hilly and uneven bottom, the earth, liable to be turned aside from its general course, and throw its local eddies in all directions, by causes which we do know, and many which we do not know.

Its upper currents are more generally running either across, or directly opposite, to its lower ones, as any one who watches the movements of the various strata of the clouds it bears along with it can clearly see. Our little vanes, perched at low altitudes above the earth, are often no sure indication of the general drift, even of the lower current, while they tell us nothing at all of any of the upper or higher ones. Could we not have a small balloon, somewhat like the one children throw up, anchored to the earth by a twine, with streamers attached to both the balloon and

twine, at proper intervals, which would make our observations of the courses of the various air currents more complete and satisfactory? But when all is done, however complete our instrumentalities, and however careful their record and their use, we can never get at a real science of meteorology, until we can comply with Prof. Maury's suggestion: and by co-operation with all the peoples, under our own latitudes at least, make the circuit of our observations embrace all the mutually dependent fields of observation around the entire globe; a so-called science from any narrower field, even if obtained, would evidently be only empyrical, and could never be made complete.

I throw out these suggestions, not only to encourage all to observe both the weather and the signs of the weather, which we now have, as well as they can, but also, if possible, to stimulate our scientific leaders and teachers in our schools and universities to perfect both their instruments and their habits of using them, so as to adjust them to our practical as well as our scientific wants, and to incite all to unite in some effort to form a meteorological alliance with all the other nations of the earth. With proper care and thought there is no inherent difficulty in learning to forecast and predict both the seasons and the storms any more than there once was in the case of eclipses, or the return of the meteors. If the laws are more complex, they are equally solvable, when their data are once well known. What untold millions of wealth such a capacity would save to the race, in all departments of life, and especially in our own most beautiful art, it is wholly needless to suggest.

VEGETABLE GARDENING.

BY A. L. HAY, JACKSONVILLE, ILL., MEMBER OF STANDING COMMITTEE ON VEGETABLE GARDENING.

During the last quarter of a century, probably not a year has passed without giving to the world a half dozen or more volumes of sugar-coated literature upon the subject of Vegetable Gardening.

It has been the aim of writers generally to show only the flowers and figs, leaving the deluded followers after worldly wealth an enormous onion, or to snag themselves upon the thorns and thistles. This brilliant style of exhibiting the bright side of the vegetable kingdom has induced many a thriving mechanic, and many a poorly patronized professional man, to turn from "the even tenor of their way," and to devote their time and attention to harrowing, or otherwise lacerating the bosom of mother earth, for the purpose of obtaining the treasures which lie hidden in her chemical laboratory. That this unwise or undue use of the pen has been the cause of many failures in vegetable gardening, by leading the unsuspicious beginner to expect too much, there can be no doubt. But a writer who would waste his or her time and paper in the compilation of a volume of the downs, and say nothing of the ups; that would write only of the failures and forget to mention the fruits; that would enumerate only the back-aches and neck-aches, and entirely ignore the pleasures and

profits; that would name and describe every species of the great army of injurious insects, and their onsets, but give the reader no insight into the agencies provided by Providence for checking their undue increase, or speak of the artificial means employed for their destruction, would undoubtedly be condemned by every lover of vegetables throughout the land; yet he would be as worthy of credit as the writers of the sugar-coated literature referred to.

With the exception of the Irish potato crop, the past season—especially throughout the central portion of the State—has been unusually favorable to the growth of vegetables. In no case, at least within my knowledge, have insects been so numerous as to seriously threaten the destruction of any crop. The Colorado potato beetle, which has for the past few years proven such a formidable enemy to the potato grower, did not, except in isolated cases, effect any considerable damage. So far as I am aware, there have been no new remedies discovered for the subjugation of this insect; but the application of Paris green in early spring, before the depositing of eggs has commenced, will be found far more beneficial (by the destruction of the beetles) than if not applied until after the hatching of the larvæ, as is generally the case. Paris green will also be found an excellent remedy for the striped cucumber beetle; but when applied to young vines, it should be carefully mixed with at least twenty times its own bulk of some material of nearly the same weight; as if mixed with a much lighter substance, it will be likely to separate from it, and thus be too strong for the vines, and destroy them. Gypsum is probably the best and most economical article for this purpose, as it is easily passed through an ordinary pepper box, or other similar sifter, and at the same time stimulates and strengthens the plants.

About the tenth of last May, the cut worms began their work in good earnest, and for a time required the careful attention of the gardener to preserve any thing like perfect rows of cabbage or tomato plants. Being nocturnal in their habits, the gardener must use a little strategy in their destruction, or perform the tedious operation of calling upon them at their private residences during the day. If very numerous, they may be captured by placing bits of boards or wads of grass between the plants, under which, as daylight approaches, they gather in large numbers, and may be easily hand-picked and destroyed. If this precaution is not taken, they may be found a few inches from the root of the destroyed plant, and about an inch below the surface of the ground, enjoying a quiet, peaceful rest. Here the instinct of robin redbreast comes in to our assistance; and as he hops nimbly over the ground, he easily detects their hiding place, and as coolly as if this was his only earthly mission, drags them from their little beds, and hastily places them where they will do the most good.

About July 10th, the cantharides or blister beetle made its appearance, and without stopping to discuss the probability or propriety of eating the Colorado beetle out of house and home, immediately began feeding upon our Irish potatoes, tomatoes, and many other varieties of vegetables. This voracious insect sometimes appears in such numbers as to

entirely destroy whole fields of potatoes or tomatoes in a few days. Paris green may be used as a remedy, with excellent effect, but cannot be safely applied to the tomato; and the herding or driving remedy must be resorted to. By placing windrows of dry hay or straw, or other combustible material, every few rods, or in vacant places through the field, they may be driven into them and destroyed by fire.

During the last three or four years the onion louse, a very small insect, almost imperceptible to the naked eye, has made its appearance; it attacks and destroys the onion top when the bulb has made about half its growth, thereby greatly diminishing the quantity and keeping quality of the crop. Its presence may be known by the grayish appearance of the tops and their early falling to the ground. If one of the badly affected tops be placed under a glass, dozens of the little rascals may be seen running in every direction. As onions usually are being constantly used by the family or for market, Paris green cannot be safely applied; but I have peppered, and salted, and sooted them; have sprinkled them with gypsum, air-slacked lime, wood ashes, road dust, soap suds, tobacco water, and vinegar without effect; and shall next try lager beer and whisky, and see if the agencies which have been so successful in demoralizing the human race will have the power of upsetting the equilibrium of this little, calm and self-composed enemy of the onion.

It will be well for the over-confident beginner in the culture of vegetables to understand that for every variety of vegetables grown there are several species of insects ready and willing to assist him in the premature harvest of his crop. It is not probable that all of these will make their appearance during the same season, but it would be something remarkable if a summer should pass without bringing enough of them to puzzle the brain of a skilled entomologist, should he attempt their classification. But all insects are not injurious, and every tiller of the soil should make it a point to understand the habits of our most common species, that he may favor his benefactors in this, as in any other branch of economy; for to practice their indiscriminate destruction would be as unwise as to place no check upon the increase of any. In point of importance I believe that the different species of the lady-bird (lady-bug) might safely be placed at the head of the list of beneficial insects; then there is the spined soldier bug, the gebia grandis, and the May species of the ichneumon flies, besides hundreds of others that are continually operating for man's best interests.

Many of our birds are almost wholly insectiverous, and if properly encouraged, would do much towards ridding a garden of its insect depredators. If the cultivator will but make himself acquainted with the natural agencies provided for his easy escort over the stumbling-blocks in vegetable gardening, he will be the better enabled to take advantage of circumstances, and there will be much less liability of being carried away by the undertow, or of fretting himself to death over the little difficulties continually confronting him.

The time for the planting of vegetable seeds will vary somewhat with the character of the season, or with the notions or those planting them.

For instance, a cultivator of considerable experience believes that cucumbers, to be grown straight, must be planted on the first day of May; otherwise they will curl and twist until they become unfit for use; and another may recommend the planting of peas only when the cat's tail curls to the right, as the only certain means of inducing them to cling to the brush, or other support provided for them; while another, with equally as good foundation for his belief, might say set cabages only when the "man in the moon" eats his soup with a butter ladle, and claim that it would secure large and solid heads, and insure the plants from the attacks of cut-worms. And yet there are many who do all their gardening "in the moon;" and during the past season I have heard a number of the latter class remark that in their opinion the profits of vegetable gardening were all moonshine.

My own belief is somewhat similar to that of Josh Billings in regard to the setting hens: he says the best time to set a hen is when she is ready and wants to set; and I believe that, with the exceptions of guarding against the attacks of insects, as may be done to a certain extent in some cases, the best time for sowing or planting garden seeds is when the soil is ready to receive, and the cultivator ready to sow them. For instance, as soon as the soil is dry in spring, even if this should occur in February, sow peas, radishes, lettuce, spinach, onions, beets, cabbages, parsnips and turnips, and plant potatoes for early use, without waiting for the expected heavy frosts and snows, or for the moon to get a little farther on its back, or hang a little more on its north or south corner. The frosts and snows may come, but all these seeds will be perfectly safe; and when genial spring comes, your early, or as it appears to many, ill-timed labors, will be rewarded by early results, that would tickle the palate of the most fastidious epicure. If possible, the ground for this early planting should be prepared in the fall. First plow deeply, then manure heavily with well rotted manure, which should be plowed under to the depth of three or four inches, leaving the surface rough. Before sowing in the spring, level the surface with just as little labor as possible.

Peas should be covered with three inches of mellow earth, beets with a half inch, and smaller seeds as lightly as possible. Later in the season, as the ground becomes dry, all fine seeds should be rolled to insure germination.

During the latter part of April it is usually safe to plant sweet corn, beans, melons, squashes, cucumbers, etc. Cold and wet weather may cause them to rot in the ground, or frosts nip them after making their appearance above ground, but the trouble and expense of planting is so small that it may be repeated without causing a financial stringency, and at no loss of time in securing a crop.

Celery is one of the most delicious vegetables grown; but its cultivation is attended with so much trouble and expense, and the results so very uncertain, that it is found on but few tables in the land except as a luxury. It requires a cool, moist atmosphere, and it cannot be successfully grown during the scorching heat of summer. Where strong, healthy, well-grown plants can be purchased at a dollar and a half per hundred, the

amateur will find it less expensive to buy than to attempt to raise them. The usual time for transplanting in this latitude is from the middle of July to the middle of August. If the weather should prove hot and dry, the plants will require shading until they become established in their new location.

With me the following method of cultivation has proved the most satisfactory, both in the quantity and quality of the product. First, dig a trench eighteen inches deep, two feet wide at the top and one foot at the bottom; in the middle of this lay a two-inch tile drain, leaving the upper or higher end of the tile open; cover this with six inches of finely pulverized earth and well rotted manure, thoroughly worked together; set a row of plants on each side of the tile, six inches apart in the row; shade a few days, and water only through the tile below. If the trench has but one or two inches fall during its entire length, the water may be let in until the tile is filled; but where the fall is much greater than this, the water should be allowed to escape at the lower end of the tile, and a small stream allowed to run for half a day or more at a time.

Celery set in this manner may be fed with any nutriment best suited to its growth; and when it is furnished with a continual supply of moisture, its flavor is much improved.

What will we do for a late potato that is any thing like sure or certain to return the cost and labor of planting and cultivating the crop, is a question that at this time agitates the mind of nearly every potato producer and consumer in the land.

For the last four years, the Peachblow has, with us at least, proved almost an entire failure. The Peerless, which was put upon the market for the purpose of driving the Peachblow into oblivion, although a good potato to yield under favorable circumstances, has not gained even a fair reputation for the table, and its cultivation is likely to be entirely abandoned. The Neshanock has for several years been discarded from the market. The Flukes and Pinkeyes are only known to people of years ago; but Shaker Russet has gradually gained the favor of the public, until it is known as the most certain to produce a fair crop, and at the same time sustain a fair reputation as a table potato. So far is this the case in our county that it has been the only variety of home grown potatoes offered in the market to any extent during the past three years, and next season will be planted more largely than ever.

Among the new vegetables brought before the public during the past season, and I believe deserving a more extended cultivation, I would mention the Cavodo Victor tomato. So far as I have experimented with this variety, I have found it to be at least ten days earlier than any other. The fruit is usually very smooth and flat, the flesh firm and solid—in this respect equal to the Trophy; flavor, excellent; color, dark red; fruits heavily, and as late in the season as any other variety; plant, stocky and firm.

The training of tomatoes is a matter of considerable importance to one who expects to market the crop early; they must be kept off the ground to prevent rot, and if early fruit is desired, the sun and air must

be admitted; and the system that will best accomplish this is the one to practice, although the first cost may not be in its favor. Brush laid along the sides of the row, and the vines allowed to spread over it, is a good and cheap plan for the purpose; or if the lower ends be sharpened, and three or four good strong bushy limbs be set firmly around the plant, the vines will find their way through, and the same object will be accomplished at a less expense in space than in the former way. Square frames, made of four pieces, three feet long by one or one and a half inches wide, with three or four pieces of lath nailed on either side, to keep the plant in place, will be found a good way to train tomatoes for late use, but it confines the plant too closely for the early maturity of the fruit.

TREE-GROWING UPON THE PRAIRIES.

BY ROBERT DOUGLAS, WAUKEGAN.

It has often been asserted that if evergreens were adapted to the prairies they would have been found growing there by the early settlers. The same arguments have been used to prove that the prairies are not adapted to timber growth. I had supposed, however, that these opinions were exploded long ago; at least, that they could not possibly be entertained by men who have been in the habit of traveling over these prairies for the past twenty years, and must have seen groves, both natural and artificial, making rapid annual growths on nearly every prairie in the State.

It was therefore with snrprise that I listened to a report on "Ornamental and Timber Trees for Southern Illinois," read by Mr. Flagg, at our last meeting, from which I will make the following quotations:

"All trees, nearly, I may add, seem to me more healthy in our southern Illinois soil than in the centre and north." * * *

"As I look upon the somewhat unwholesome evergreens that I met upon our great prairies, I sometimes fear that it will be many generations before the soil will be fit for healthful growths of deeply rooting trees." * *

"Probably some of the hardier and less fastidious forest growths, such as the willow, the cottonwood, and the soft maple, must pioneer the way and fit the soil and subsoil for more delicate and valuable growths."

After Mr. Flagg had finished reading his report, in reply to a question from Mr. Scofield, he said: "I do not believe that the prairie of central and northern Illinois is the natural habitation of trees. The very existence of these prairie lands shows an original unfitness for their growth. I think that such trees as the cottonwood and white elm must pioneer the way for other tree growths."

When asked to name any location on the Illinois prairies where evergreens have that "somewhat unwholesome look," he named Bloomington. Now Bloomington is one of the largest cities in the State, where the burning of thousands of tons of soft coal certainly gives an unwholesome appearance to both the evergreens and deciduous trees that come within the bad influence of its smoke; but in other localities, in and around that

city, fine stately evergreens may be seen in very large numbers, and as thrifty and healthy as can be found anywhere of the same species.

Bloomington is situated on the Grand Prairie, the very prairie Mr. Flagg afterwards named as one he had reference to, and said he did not mean that his remarks should apply to those with sandy or light subsoils.

Now as the largest nurseries in the West are situated on Grand Prairie, and both deciduous and evergreen trees are growing there in almost innumerable species and varieties, and will compare very well in health and vigor with trees grown elsewhere, is there any reason to fear that "cottonwoods, willows and soft maples, must be grown for many generations," to fit the soil for more delicate and more valuable forest growths?

Mr. Flagg contends that the prairies underlaid with a cold clay subsoil are unfitted for the growth of valuable timber, yet we find that many of our valuable forest trees, and some of them "deeply rooting trees," at that, grow better in such soil than in any other; and we judge this to be the case, not only from their condition since they were planted on such prairies, but from the same species attaining their best growths on similar soil in other parts of the country.

Among the valuable forest trees which prefer a cold clay subsoil to a warm sandy soil and subsoil, are the black walnut, the hickories, the most valuable species of oak and ash; then the white pine, the hard maple, the most valuable birches, and many others, grow quite as well on the prairies and on a cold clay subsoil as on any other. These are all natives of our State, and named from memory, as trees that I have seen growing well, both indigenous in this State and also planted on the prairies.

Although these include many of the most valuable timber trees native to the State, they are not by any means all that could be named, but quite enough to show that we can dispense with the missionary labors of the "cottonwood, willow and soft maple, for many generations," if we do not want them for any other purpose. When we come to the more delicate trees we are entering a very wide field, and cannot take the time to discuss their adaptation in a short paper; but it is not necessary here, as we find that the most valuable forest trees are not delicate. We may, however, say, in passing, that many trees are delicate only when an attempt is made to grow them too far north or south, or on a soil not adapted to their growth.

The chestnut is delicate when grown on a cold clay soil; on the other hand, the balsam fir soon becomes delicate, and makes a poor, stunted tree, when grown on a warm, sandy soil.

We know that trees on a warm, dry soil, ripen up their growth better before winter sets in, than on a cold, damp soil: hence a plum tree, for instance, is not so likely to kill back when young on a warm, sandy soil, yet a clay soil is the only one on which a plum tree will ever come to perfection. I know that many people contend that if a tree is delicate it must be placed in warm soil, where it will ripen its wood early, they say, or it will not stand the winter. Now the tulip tree, the cucumber tree, the catalpa, the white fringe, and several others I could name, are delicate in our northern latitude, nine miles from the Wisconsin line;

they are all trees that prefer a cold subsoil, and I find that they will stand with me much better in a cold clay subsoil, than on the warmest and best prepared land.

Mr. Flagg asserts that "the very existence of these prairie lands shows an original unfitness for tree growth."

This would apply with equal force, nay, with greater force, to the sandy and warm subsoil prairies, as they are even more destitute of timber than the others.

It would also apply to the prairies of Nebraska, and likewise to the moors of England and Scotland, all of which were as destitute of timber as our Illinois prairies, and, I may add, on all of which timber has been found to grow with remarkable vigor.

There seems but one difficulty to attend the growing of trees upon these lands, and that will apply to one as well as to the other, and applies to all exposed, level sections of country: it is the lack of shelter.

We all know that it is harder to establish a young orchard, a grove, or an ornamental plantation, on an open, level section of the country, than in a broken, hilly or timbered country; and wherever you see a tree standing alone, and exposed to the winds, no matter what the soil may be, you will see that it will not grow as thriftily as if sheltered by other timber, or by inequality of surface, buildings, or hills.

In the extensive forest plantations of Europe, this is so well understood, that while they are at no expense in fitting or enriching the land, they are at vast expense sometimes in supplying shelter, until the forests become established. When the trees are once fairly rooted, they are expected to protect each other, as they have been planted closely for that very purpose.

The casual observer may be pardoned for jumping to the conclusion, that as willows, cottonwoods, and soft maples, are found more plentiful in the prairie region than other trees, therefore they are better adapted to prairie lands than any others. The practical tree-grower, on the other hand, will notice, first, that there were no trees growing where the fires could reach them; then having examined the timber on the streams, he finds the three trees alluded to by Mr. Flagg more plentiful than any others. He asks himself if there are not other trees, as well as these three, that will grow on lands saturated with water. Having satisfied himself that this is the case, he then looks to see what power these trees possess to reproduce themselves, over others that grow on similar land, and consequently, like them, protected in a great measure from fires.

He finds that the willow and cottonwood produce immense quantities of seeds, arranged in such a manner that the winds will carry them to great distances; that they will germinate in very wet soil, immediately after they leave the tree, and make a growth the same summer, while almost all other trees ripen their seed in the fall, which are consequently liable to be destroyed by fires, if on dry ground, or by water, if they fall on moist ground, for few seeds will bear soaking in water the whole winter. The soft maple also ripens its seeds in spring, which germinates immediately, and although it is not fitted to be carried so far as

the other two, yet it is a winged seed, that can be distributed a considerable distance from the tree on a windy day; it has also the power to float on the water, and is carried by the current, and eddied into every little cove, and left on the shores and islands as the water recedes. So we see that while these three trees are admirably fitted for the low lands, by ripening their seeds in spring or early summer, that very habit would really unfit them for growing indigenous on ordinary uplands, while the trees that ripen their seeds in autumn distribute them so that they are in a condition to germinate in spring. Hence we come to the conclusion that, had we found our whole State covered with timber instead of grass, we would have found these three trees only on the wet ground. We all know that although we never find these three trees growing on the upland, yet when planted by man they grow well there.

No man can carefully study the conditions required for the germination of the different kinds of tree seeds, without coming to the conclusion that they have a great deal to do with the abundance or scarcity of any given kind in a particular locality.

Nature is so liberal with her tree seeds, that she probably produces a million of seeds for every tree she brings to maturity; and the same ground on which she distributes them is also freely supplied with seeds of shrubs, perennial and annual plants, and there is a continual strife going on to see which shall get the mastery; she seems also, in the main, to have been very fair in her distribution, as the seeds that are most liable to be destroyed are produced generally in the greatest abundance.

The arbor vitæ produces very many more seeds than the oak; on the other hand, acorns will germinate more easily, and are not so liable to be destroyed the first few months after germination, either by excess of sunlight or shade. The oak may push its way through surface vegetation; the arbor vitæ can not do so. In my opinion the oak's greatest advantage lies in its power to resist fire, and in its ability to retain life for a great length of time when overshadowed by other forest trees.

An experienced forester in Europe says: "The oak, after yielding a heavy crop of timber, springs up from well dressed stools, far stronger than in the best plantations newly formed in virgin soil."

He recommends that oaks be interspersed in pine plantations, and says that "although these plants are scarcely discernible during the vigor of the pines, yet being tenacious of life, they keep the ground, become deep rooted, and are ready to spring up on the removal of the crop of timber. In such cases, or in the case of fire destroying a plantation, the oaks act a conspicuous part in speedily renewing the appearance and ultimately becoming valuable."

Now this man's experience with the oak in Europe agrees exactly with our experience with it in the forests surrounding our prairies, and we see how different it is with the evergreen timber. A fire that would run through a forest, and only scorch the bark without injuring the oak trees, would be likely to destroy all the evergreens in its path, as the bark is much more sensitive to fire, and the foliage will burn much more readily than the foliage on the oak. Even if the oak tree is severely burned it will

force out a new growth from the trunk, or the surface of the ground, but the evergreen can do neither; then the fire will destroy the seeds of all the evergreens that may by lying on the ground, while many of the acorns, having been trodden into the ground by animals that feed on them, might escape the fire and renew the forest. We find evergreens still scattered in our forests, but we notice that every old tree stands in a position where the fires could not reach it.

The red cedars and arbor vitæs are standing on the bare bluffs, in the ravines, and around the borders of our inland lakes; the white pine on the gravelly bluffs, in nearly every northern county, but invariably the old trees will be found where the fires could not reach them. Within the past thirty years, or since the fires have been kept out, the red cedar berries have been carried into the woods and old clearings by the birds, and many fine trees may be found growing a great distance from the bluffs.

No one can follow this seed study thoroughly without coming to the conclusion that the extinction of a species is generally owing more to its inability to find an unoccupied spot suited to the germination of its seeds, than to any disease, or lack of original vigor in the tree or herb.

Where are the hundreds of beautiful annuals and biennials we used to see growing all around us twenty years ago? They were not able to push their seedlings through the blue grass sod that was creeping steadily on, year after year, till in a very short space of time it occupied the whole ground. The same blue grass and other tame grasses, so called, are destroying hundreds of your native forests to-day. To satisfy yourselves on this point, compare the forest land that has been fenced against stock, with the land that has been left to commons, and you will see that young trees have sprung up on the former since the old timber was cut away, and give every sign of making a better forest in time than the original was.

The forest on which the cattle are allowed to run is being rapidly covered with the tame grasses, matting the ground and preventing the seeds that are produced on the few old trees that were left standing from finding a spot on which to germinate. I had almost said just as the buffalo may have destroyed many a fine forest on our prairies; but I wont go back many generations, and will stick close to plain facts, leaving theories to be used where facts are not to be had.

Darwin says the oaks have driven the pines to the sands. He would have been just as correct if he had said, the *fires* have driven the pines to the sands; for we know that there is not a spot where oaks will grow but pines can be made to grow, and the pines will grow where oaks cannot be made to grow at all.

The pines will grow on quite as dry lands as any on which the oaks will grow, and on lands quite as wet; on lands as clayey as any on which oaks will grow, and on lands so sandy that the oaks cannot be made to grow at all; they will grow up higher in the mountains, and down as low in the valleys; they will grow much further to the north, and as far to the south. Therefore we see the wisdom of Providence in giving the oaks the power to resist fire, and also to sustain life for a great length of time,

under the shade of other trees better than the pines; otherwise the pines would have driven the oaks entirely out of existence, for we see that if the oaks and pines are started together, the former can never become perfect trees until the latter are destroyed.

A. J. Downing says: "In Maine, New Hampshire and Vermont, the white pine abounds in various situations, adapting itself to every variety of soil, from dry, gravelly upland, to swamps constantly wet;" and as this tree can be found in Lee, Bureau, La Salle, Lake, and other counties in this State, where it has been planted over twenty years, making a much more rapid growth than in any of the States named by Downing, we see how fortunate it is for us that it has not the power to resist fire, and push its seeds through surface vegetation like the oak; else, we might have had our whole State covered with a pine forest, and this would be altogether too much of a good thing.

Mr. Flagg gives the height of trees in Southern Illinois, showing taller timber than any to be found in the central and northern parts of the State; but several reasons can be given for this difference of size, without charging it to the unhealthiness of our trees. The land in Southern Illinois is more broken and therefore not so liable to be periodically swept by fires as level lands, covered with rank vegetation, and it is reasonable to suppose that the fires did not run there as they did in the center and north.

When I came to Northern Illinois, thirty years ago, I spent a great deal of my time in the forests. My business at that time was cutting down forests, and not, as now, building them up; and my experience in that line convinced me that there were very few, if any, large trees, or medium ones either, that had not been several times, during their lives, more or less damaged by fires, and that the largest trees were found growing where the nature of the land seemed to partially protect them from the fires; and it seemed to me that this had more to do with the size of the timber than the difference in the quality of the land on which they grew.

Our forests, at that time, seemed to have been swept clear of undergrowth, so much so that a man or a deer could be seen at a great distance, and on examining the young oaks, that were just making their appearance, you could see that they had been burned down many times, making a great deformity at the surface of the ground.

Under these circumstances, we could hardly expect to find trees of remarkable size.

Again, my observation has led me to believe that, go where you will, you will find the tallest trees in declivities, protected, in a measure, by higher lands, whether it be bluffs, hills or mountains. I have not seen the tall trees in Southern Illinois, of which Mr. Flagg gives the heights, as measured by Mr. Vasey, but I have noticed this to be the case in the Green mountains, the Alleghanies, the Rocky mountains, and the Sierre Nevadas; and I have no doubt, if you examine the surroundings, you will find that extraordinarily tall trees are protected from the prevailing winds by very high hills.

In concluding this already too long article, I would say—Do not wait "several generations" before planting "valuable timber," when you see that your prairies are already fitted for its growth; and while you study the natural sciences, do not let wild theories run away with your common sense. Do not run into past and future generations, to the neglect of what is going on in the present.

No doubt nature is slowly changing the surface of the earth—always has and always will be making very slow changes. Yes, very slow indeed—entirely too slow for us. Man will take a plant and make more change in it in half of one generation than nature, unaided, could have made in it since the commencement of the Christian era. Man will take a poisonous plant, and by cultivation make of it a nutritious edible to supply his table; and then if he neglects it, and leaves it to nature's care, it will soon run back again to a noxious, unwholesome weed.

The common parsnip is an instance of this. Nature made the astringent pear and the unwholesome peach unfitted for the food of the beasts of the field. Man fitted them for the palate of the epicure.

Then supposing nature has, in myriads of ages, brought us magnificent trees from the lowest orders of vegetation—which is certainly not fully proven yet—or even supposing the Chinaman, in the remote past, did wear his cue at the lower extremity of his spinal column, instead of at the upper end, as now, neither the one nor the other has any bearing on the subject in hand—the growing of forest trees on the prairies.

Therefore, do not wait for "several generations," but go about your work now. You know that you have one of the fairest and most fertile spots on earth; that the only one thing lacking is a due proportion of timber. You know that even this seven per cent. of timber land, made out by the Census Report of 1870, has been mostly cut away; and it is in most parts old clearings turned out to commons, or into pasture, that are called "woodlands" in the census reports.

You know that most of the valuable forest trees that are natives of your State grow better on the prairies than elsewhere, and you know that your evergreens, a year or two ago, did not suffer so severely as the same kinds did in the eastern States, and on the dry, gravelly lands in the Fox River District.

You know that apple and cherry will not thrive on cold, wet, clay subsoils, whether it be on the prairies or elsewhere, and that the same is true of the beech and chestnut; so that your success depends, not on whether your lands were originally prairie or timber, but on the selection of the kinds of trees best adapted to your soils.

Since writing the foregoing, I have read Mr. Flagg's paper upon "Conditions of Tree Growth," found on page 36 of this volume, and find that he has so modified his views since last year, that they very nearly meet mine. In fact I may say we agree that valuable timber trees will grow well on all prairies suitable for growing farm crops, but not on bogs, sloughs, nor lands composed mainly of peat. But as he has not so stated, I will not claim it. I only draw the inference, and will follow his report, naming the points wherein I differ with him.

I will refer the reader to page 36, wherein Mr. Flagg gives the proportion of timber land in the State, as shown by the Census Report for 1870, and for this I thank him. I think, however, he will admit that in Northern Illinois, at least, most of the large timber has been cut off, leaving only the culls and the young timber that has grown up since.

Riding along a road in Iowa, skirted on each side with such timber, three or four years ago, in company with Arthur Bryant, Sen., Samuel Edwards, and Suel Foster, the conversation turned on this subject, and they agreed that this was substantially the case, as far as their observation went; and I may say that if I was asked to name other three men, more likely to observe closely the forests in their travels, I could not name them.

On page 37, Mr. Flagg says: "So that even though trees have not sprung up spontaneously, they may, with due care and attention, be planted and established so as to live a reasonably long life."

One would be led to infer from this that he is either of the opinion that land on which trees have not been found growing will not produce very long-lived trees, or else that trees, or seeds of trees, planted by man, will not produce very long-lived trees. Facts in abundance can be produced to disprove either proposition.

Following him a little further on same page, he says: "But it is true that in the West, at least, we must expect a permanent disability in securing the perennial vigor and centennial life that is attained in climates of fewer extremes." Now why take this discouraging view of the subject? He has just told us on page 41 that "on the bluffs of the Platte, Missouri, Canadian and other rivers, it (the red cedar) appears with trunks three or four feet thick, which, judging from its slow growth, must be of immense age."

He shows in his own report that in the Dacotah, Wasatch, and Yellowstone regions, where the climate is drier, and the extremes of heat and cold greater than in Illinois, timber will grow larger and live as long. Then his theory that because we adjoin the timber lands of Indiana, and are almost surrounded by timber, hence our soil and climate is better adapted to timber than further west, dissolves itself into thin air when we go into Nebraska—a State with probably less timber than any other State with the same number of square miles, inhabited by civilized man, and surrounded on the east by open prairies, on the west by the rainless plains, and on the north and south by lands as destitute of timber as its own, and yet it will grow timber when planted as well as any State surrounded by timber. I think Nebraska has planted more timber trees the past two or three years than any other western State, and with as good success, and can show as good growths on what has been planted.

Mr. Lesquereaux' theory of "the formation of the prairies from the base of the Rocky mountains to the Mississippi valley, and the prairies around the lakes," as quoted by Mr. Flagg, pp. 37 and 38, is reasonable, and not doubted, as far as I know. But when, in describing the peculiar nature of the soil of these prairies, and giving as a reason why trees will not grow on them, he says it is because the soil is of a nature partaking as much of peat as of humus, etc., he is falling into the same error that

Mr. Flagg fell into in his report last year, viz., in taking the exception for the rule; and I agree with them both that "it is easy to understand why trees will not grow on such a kind of ground."

The prairies, from the Rocky mountains to the Missouri river, are, as a whole, deficient in humus, while the prairies, from the Missouri river to the lakes, are well supplied, and, in some cases, as in some of the low, flat prairies, are in excess, and to such alone will Mr. Lesquereaux' theory apply.

The deficiency of humus is so marked in most part of the land, from the Missouri river to the base of the Rocky mountains, that many writers have attributed the absence of timber to the lack of vegetable matter in the soil.

The author of "What I Know About Farming" gave as his opinion, that before it would produce timber and farm crops, it must for a great length of time be made to produce some annual or perennial plant, that, by the yearly decay of its leaves and stems, would in time form such vegetable mould, or humus; but it did not seem to occur to him that the same conditions that would be required to produce this rank vegetable growth, could be made to produce timber.

Another writer of note, who wrote many exhaustive articles on this same locality, gave as his opinion that it would be impossible to grow timber in the buffalo region, giving as his reason that the evaporation in that climate is greater than the rain-fall; but it seems not to have occurred to him, that this objection would apply equally as much to the buffalo grass and other vegetation growing there now.

Mr. Flagg's quotation from Henry Englemann, p. 38, says: "But as our prairie soils do not appear to have any very peculiar composition, chemistry may account for the absence of certain species of trees, but certainly not for the absence of all trees." Now this will apply to our northern prairies, as well as any other, and will apply equally to Indiana timber lands, and to lands generally.

To Mr. Flagg's question regarding the persimmon, on p. 40, we reply, almost any tree that will grow in a wet soil will grow on a dry soil. Most of our troubles come from trying to reverse this rule; probably the seeds of the persimmon have the power to germinate in a dry soil. I have already endeavored to show that the only reason for the willows and many other trees not being found in dry soils as well as wet, is their inability to germinate their seeds on dry land. We have willows growing in our streets for shade trees, planted many years after I came here, that are now thirty inches in diameter, and this on dry, gravelly soil. He asks, "Why does the willow of the wild species affect the streams rather than the ponds?" We answer, that the seeds have a much better opportunity of distributing themselves along a river's brink, than over a long stretch of dry ground, to a solitary pond, and if they should reach a pond they would of necessity have to take root on the outside of the water, if at all; and as I have already stated, their seeds must germinate in early summer. Now as the ponds are high early in the season, and low in the fall, when the fires run, we can easily account for the willows being found less on

ponds than on streams, for admitting that the streams are lower also, as undoubtedly they are, still there are islands and bayous where enough trees escape the fire to distribute the seeds.

Then another reason is, that any tree will bear a larger amount of running water, and would not be as healthy on the margin of a pond, in stagnant water, as on the margin of a stream, either in prairie or timber land. I agree with Mr. Flagg, that valuable timber trees will not thrive in peaty land saturated with stagnant water, but this applies to timber land as well as prairie.

When Mr. Flagg speaks of poisonous subsoils, I do not understand what he means. I have never seen any indications of poisonous subsoil. I have used the blue clay underlying the peat or muck. I have seen soils dug out of wells and the canal, and out of sloughs of even, when digging wells to water cattle, and have noticed often, that where a little mellow soil happened to get near it, to give seeds an opportunity to get their roots into this adhesive blue clay subsoil, they grew quite thriftily.

He asks, on page 40, why the blackjack oak and mocker-nut hickory start up in the prairie where no other oak survives. Neither of these trees grow in the northern part of the State, where I reside, but if they did, I would examine them to see if they were more free to start from the collar, after being burned down, and if not, whether these acorns and nuts are preferred to other kinds by any gopher or other animal that would be likely to carry them out on the prairies, and also whether the seeds of these two trees will endure longer in the ground than other tree seeds equally plenty in that region.

When Mr. Flagg, page 41, draws a comparison between Mr. Dunlap's sweet cherry and Mr. Vickroy's sweet chestnut on the one side, and with the catalpa, white ash, elm, and butternut on the other, does he not see the same difference between them on the prairies in Champaign county that he would find between them on clay subsoil in timber land? and does he ever expect that any amount *of fitting* will ever make a strong clay subsoil suited to a sweet cherry tree?

Next, as to Mr. Scofield's success at Elgin. Now compare it with that of Samuel Edwards, at Lamoille, on a clay subsoil prairie. Mr. Edwards' success is quite as marked as Mr. Scofield's, and they both, from their own experience, on lands quite dissimilar, agree exactly, and recommend the same trees. This only proves what horticulturists have always contended for, viz.: that some species of trees will only thrive on a warm, sandy soil, others on a cool, clayey soil, while much the greater number will grow equally well on either.

I have already called attention to the distribution of the red cedar by birds, and this, in a measure, will account for it being found over such a great extent of country, as shown on page 41, in Mr. Flagg's quotation from Gray. Of course I do not claim that many trees would grow on as wide a range, even if planted, but I contend that this tree could not propagate its species in many places where I have found it growing, if it produced seeds like the pines. I can testify to this tree being able to resist drought to a remarkable degree, as I have seen it

clinging to bare bluffs, in the rainless, treeless region; but I cannot agree with Mr. Flagg, page 41, that "it is the one evergreen that the drought of the plains cannot kill." We see the *Pinus Flexitis*, *P. Contorta*, *P. Ponderosa*, *P. Aristata*, and other evergreens, enduring as severe drought, and as severe a climate as the red cedars. True, we do not find them extending down the Platte valley quite so far as the red cedar. because their seeds could not germinate so well. The red cedar seeds are encased in a hard shell and covered with a pulp or berry; this pulp must rot, through the action of frost, or heat and moisture, before it can germinate, and is thus admirably fitted for endurance. We find them coming up in our nursery beds, from seeds sown five or six years ago, although the ground has been worked over several times during that period; and we may see how they may drop on the dry, bare bluffs of the Platte, and be covered by the soil that is constantly crumbling and sliding, especially as the frost is leaving the ground in spring, and there lie, till a moist spring may give them the proper amount of moisture; it is reasonable to suppose that seeds have lain buried deeply, in this way, for many years, and then, after another slide, and an unusually moist spring, have found the right conditions to germinate. It must be borne in mind that there were very few red cedars on the bluffs of the Platte when I saw them twenty-five years ago; there were none to be seen when I went that way lately. It will be seen that had these pines occupied these bluffs with the red cedar years ago, of which I have little doubt, it would have been impossible for them to remain, as their seeds, if covered deeply, would perish, and if not covered deeply, could not find moisture to sustain them till well rooted; but up in the Black Hills, a little further west, a kindly rock gives them opportunity to draw moisture till rooted.

ORNAMENTAL AND LANDSCAPE GARDENING.

BY J. P. BRYANT, MEMBER OF STANDING COMMITTEE.

What should horticulturists do to encourage landscape gardening?

In thinking over the subject of landscape and ornamental gardening, with a view of getting up an essay that would add, if it were possible, to the stock of information already within reach of my hearers, or one that would present old thoughts in a new and more interesting shape, I came to the conclusion that there had been so much said, and so well said, on the subject, that it would be useless for me to go over the ground again with the usual formula of trees, lawn, flowers, beauty, refinement, home attractions, etc.—at least until people in general, and horticulturists in particular, show more interest in the subject than they now do.

That they care very little (at the most *do* very little) about improving their places, is evident enough to the most casual observer; but it is more for want of stirring up, and from a general indifference to the subject, than for lack of the means for information among those who ought to do better. Not but that most persons like to see beautiful places, and have a desire for something better than they usually have. Every one of

the many trees, flowers and shrubs planted, shows that there is much natural taste among the mass of people—a taste that only needs directing and encouraging to make beautiful places the rule and not the exception, as they now are.

Books and essays on landscape gardening are not read by most people, and perhaps would not in many cases be of great value to them; but they should be *read and studied* by nurserymen, florists, and all who are interested in the growing and planting of trees and flowers. And here I think is where the trouble is—horticulturists do not give the attention and practical encouragement to the art that they should. Does it not seem a little strange that horticulturists and florists, notwithstanding the long time many of them have been exposed to what they call the refining influence of their occupations, should be somewhat behind others in their efforts to improve and beautify their places, and even in many cases seem totally devoid of any wish to have pleasant surroundings. It seems as though those whose business, in a large measure, depends on the amount of taste and refinement people in general possess, and the natural outgrowth of this, the desire of improving their surroundings and making them pleasant, should do their best to cultivate and improve that taste by setting a better example than they generally do in laying out and improving their own places. It is comparatively little trouble for tree-growers to arrange and plant their grounds in a creditable manner, if they have any desire to do so. It will be necessary, of course, to spend some time and study to lay out ground in a tasteful and convenient manner, but no more time, money, or trouble need be spent than every one can very well spare, if he is willing.

As convenience for business, ease of management, beauty, economy, and many other considerations enter into the business of laying out grounds, it is necessary to give the subject careful consideration before beginning, or in other words, have some sort of a plan to go by; for if one begins by doing a little here and there, without any very definite purpose, the result will be that he has something on his hands that does not prove very satisfactory, and that cannot be very well changed for the better.

Probably almost every one knows that it is often more trouble to find out what he wants, and how to do it in the best manner with the means at command, than to carry out his plans after they are all arranged.

In laying out grounds and in planning for buildings, as well as in any other business, the more time and study spent in perfecting plans the more likely is the result to be a success.

Perhaps the idea that landscape gardening means something out of the reach of persons of ordinary resources has somewhat to do with the lack of interest felt by many in the subject. They forget that its principles apply as well to the laying out of small grounds by those of limited means, as to the laying out of parks and country places by the rich.

Beauty, taste and refinement, are not necessarily connected with wealth, uselessness and extravagance; but are, in their true sense, promoters of usefulness, fitness and economy. For example, as a specimen of the way planting is often done, we have only to take notice of some of

the lots in our towns and cities. A bill of trees and shrubs is selected at some nursery, brought home and planted. As the trees are small, care is taken to have the grounds well filled, so that they will not look too bare. Walks are laid out, flowers planted, and the work is done.

Additions are made, now and then, of some tree or plant that strikes the owner's fancy; the planting being generally done so as to fill some open space. As no attention has been paid to the future growth of the trees, in a few years the larger ones have grown up so as to choke and starve out, in a great measure, the grass, flowers and weaker trees, and obstruct the walks. There is no room to swing a scythe to cut the grass and weeds; and as the flowers and shrubs appear to poorly repay any care they may receive, they are in the end entirely neglected.

The whole place has a "cluttered up" appearance, and is an eyesore to all who see it. Worse than this; on many of our summer days it has a damp, disagreeable smell, that can not be very conducive to the health of the occupants, and that would almost make one prefer a place on the open prairie, where he can get a glimpse of the sun and feel the pure, fresh breeze, even if there was not a tree in sight.

This is a true picture of many places in our State to-day; some of them the work of professional tree-growers. A free use of the axe is about the only remedy.

Now if the place had been laid out with some regard to the future growth of the trees, and with some knowledge of their habits—in fact, with some knowledge of the true principles of laying out grounds—the first cost would have been less, the place could have been easily cared for and rendered attractive, there would have been that beautiful play of light and shade, that contrast of well-kept lawn, and handsome trees so charming to the eye; and the place would have been a source of so much pleasure and satisfaction to the owner that he would not part with it for many times its cost.

It is more often the case, however, that grounds are made unsightly, not by overdoing, but by neglect, and a paucity of attempts to do any thing at all. A house is built without much regard to beauty or convenience of location. Tools are bought and accumulate, being generally left where most convenient at the time. Lumber, and all sorts of rubbish, are disposed of in much the same manner. Probably work presses, and but little time is found to mow the grass and weeds around the house. Some trees are planted, but, being neglected, are destroyed by cattle or injured in some way. Every thing seems to be at loose ends, and, in more cases than one, the whole business of the place is carried on in a style corresponding with the surroundings.

Now there is no need of all this. Every owner of such a place can do much towards keeping it in order if he uses some judgment in making use of *all* his employee's time—time that would otherwise be wasted. To lay out and keep up a place, as it should be kept, implies putting and keeping every thing in order, and some kind of system in the general management of affairs. Let any one go at it in the right way and he will have no cause to regret his undertaking.

Since horticulturists, as a rule, have abundant opportunities of learning how to lay out and care for grounds, and facilities for carrying out their plans, that others have not, it seems as though they ought to take the lead in this matter, and endeavor to make their places something that they need not be ashamed of, at least; and better yet, something that will raise the standard of taste in their neighborhoods. Let each and *every one* of them do what he can to improve his own place, and then his example will be followed by many others when they see that there really is something worth having in a place well laid out and taken care of. I have no doubt that the investment will be found a source of pleasure and profit in a pecuniary as well as in an æsthetic point of view, and more than one home made beautiful and attractive by its influence. Let them all do as some have done; plant trees for shelter, timber and ornament. Let them interest themselves in the success of their customers, and render themselves capable of giving them some advice and assistance in regard to the arrangement of their grounds, so that they need not make any of the gross blunders that common sense ought to teach tree-growers to avoid; and they will be doing what they ought to encourage landscape gardening.

PLANT FOOD.

BY J. COCHRANE, HAVANA, ILL.

In my essay for the annual meeting of the State Horticultural Society, last winter, I spoke at length of the Mechanical Structure of Plants, omitting their chemical and botanical characteristics.

I now propose to notice in detail some of the then omitted peculiarities and distinctions in the organisms of a few characteristic individuals in the vegetable kingdom.

In order the better to understand the fine distinctions in the vegetable world, I will preface by a few illustrations drawn from the animal portion of organic nature.

In doing this, I will confine myself as briefly as possible to the digestive process, as illustrating the provident care of the Creator in providing so minutely for the wants of all His creatures, and contrast the processes by which food is stored up by plants and by animals for their future use. Uniformity and variety constitute the prominent characteristics of the two grand kingdoms of organic nature. Food taken by the animal creation is stored in the stomach for the uses of the system. Some animals take their food without mastication, and it is ground in the process of digestion. Others are incapable of digesting unmasticated food; some can digest only animal food; others only vegetable.

We will notice familiar examples of each class. The division of organized nature into animal and vegetable, their further division into genera and species, is not an arbitrary act of man, but a necessity found in the order which exists in external nature, and by nature itself cast into these grand divisions and subdivisions in the most perfect system and order, which systematic distinctions are maintained through all time. The

sparrow feeds upon the same food, feeds her young and builds her nest, as before the flood. Order and system is Nature's as well as "Heaven's first law." Accident may produce an abortive vegetable growth, a malformation, a wart or mole in animals, but never the full-blown rose, an eye, or lung.

In the human family, the teeth are formed for the mastication of both animal and vegetable food, and the gastric juices of the stomach will dissolve both, and prepare them for the uses of the human organism. Birds of prey with strong talons, hooked bill, as the eagle, the hawk, the owl, etc., are provided with an organization suited to the form of these members, and a gastric juice that dissolves only animal food, and will not act on seeds and grasses. The conformations of the mouth of the sheep and ox are formed for browsing upon herbage, and the gastric juices of their stomach dissolve only vegetables, and will not act on animal food. The gastric juices even of graminivorous birds will not act on grains and seeds while whole, but they must be first crushed or ground; hence they are supplied with a strong cartilaginous stomach for that purpose — an arrangement omitted in birds of prey.

Those herbivorous animals provided with teeth for the mastication of their food can not digest whole grain or unchewed vegetables, so strict is the relation between the offices assigned to the digestive organs between the mechanical operation and the chemical process.

The digestive systems of carnivorous animals can not use vegetable food. The cow, the sheep, and the deer can not digest animal food. Still further, those animals without teeth in the front upper jaw are furnished means of re-chewing their food at their leisure, as the sheep, deer, ox, etc. The horse has no such power, but has the necessary teeth to chew his food as he receives it. None of these can digest unchewed or unground food.

The remarkable distinction between birds of prey and grain-feeding birds is worthy of special note; the former not being supplied with a strong muscular stomach, as in the case of the latter, for grinding their food. It is equally remarkable that so important a chemical distinction should exist between the digestive fluid of carnivorous and herbivorous animals, while man is able to use a mixed food as his organization requires.

In birds, a soft membraneous stomach always accompanies a hooked beak, short muscular legs, and strong crooked talons. The cartilaginous stomach is found in those who have that conformation of bill and toes which restrains the possessor to picking seeds or cropping plants, as chickens, ducks, geese, turkeys, etc. The same stystem prevails in fishes as in animals. Nature's laws are general in their application, and unrepealable, though governing that "*insatiable variety*" of subjects referred to by Cicero. More interesting, if possible, are the varieties of food, and its manner of being appropriated in the vegetable world, though the demonstrations of the laws governing them and their effects are less obvious to the superficial observer. "Plants and animals have two great

peculiarities: they form themselves; they multiply themselves. They reproduce themselves in a continued succession of individuals. Minerals occur in masses, and are divisible into smaller masses without altering their properties; but organic things exist as individual beings." Animal life could not exist on the earth in the absence of vegetation. Plants purify the air for the use of animals by absorbing the carbonic acid gas so destructive to animal life, and by supplying oxygen, without which animal life could not exist.

Plants also take up mineral or inorganic matter, and change it to organic, and furnish all the food for the animal world. Herbivorous animals feed on vegetables, and carnivorous feed on the herbivorous, neither class originating any thing, but taking it ready-made from plants. Sugar, oil and starch, form a large part of the food of herbivorous animals which, by the digestive process, enter into the circulative system, and are stored for a time in the form of fat, but furnish no part of the fabric or animal frame.

The earthy and mineral matter in the animal system are received from vegetation, which a wise Creator has spread over the surface of the earth, between the mineral and animal creation. "One source of power in the plant is found in the sun's rays, which, in a sense, is plant food. It is the sun's rays that enable the plant to grow, for the growth of the plant consists chemically in a decomposition of the carbonic acid gas which exists in the air, into its simplest elements; the carbon assimilated for the building up of the plant, and the oxygen sent back into the air for the subsequent use of animals."

Another source of plant food is impure or *vitiated* air. By respiration, putrefaction, etc., air is rendered unfit to support animal life, and in extreme cases will not support it. By a constant operation of these corrupting influences, the whole atmosphere would become impure were there no restoring causes, and would become at length to be deprived of the necessary degree of purity. Some of the restoring causes have been ascertained, and their efficacy demonstrated by experiment. So far as these discoveries have proceeded, they open to us a beautiful and wonderful economy; vegetation proves the most efficient of all known restoring influences.

Here, therefore, is a constant circulation of benefits between the two great provinces of organic nature. The plant purifies and feeds on what the animal poisoned; or contaminated air is more than ordinarily nutritious to the plant. But it must be remembered that the renovating, purifying effects of growing vegetation on the atmosphere can only be accomplished under the influence of light, and ceases altogether in the night, or if the light of the sun be withdrawn. This is a general characteristic of all plants; for with all their manifold forms and varieties they are all constructed on the same general plan, "and are living witnesses and illustrations of one and the same plan of creative wisdom in the vegetable world." There is conversion, by the vegetable, of foreign, dead mineral matter into its own living substance, or inorganic matter capable of

becoming living substance. To do this is the peculiar office of the plant, working under the influence of the solar rays.

The sun in some way supplies the power which enables the living plant to originate these chemical combinations; to organize matter into forms which alone are capable of being endued with life. The process is all the same, whether the plant is making direct growth or laying up stores for future use. The principal ingredient laid up by plants is starch, in the form of minute grains, in the cells of the plant. All plants, in a general sense, receive their food from the roots; the tree receives its supply of minerals, such as silex, lime, potash, magnesia, etc., in solution; the sap thus charged with nourishment ascends the trunk, traverses the branches, and passes into the leaf. The superfluous sap, which held the nourishment in solution, passes off by respiration of the leaf, but does not part with the nutriment contained in the liquid.

The wonderful system of minute vessels which traverse the whole cellular tissue becomes clogged as the season advances; its circulating functions gradually cease to operate, and long before winter, they are wholly suspended. The leaf loses its hold and falls to the ground. The character of plants in the various countries of the earth is much influenced by peculiarities of soil, temperature, and other local influences. Plants having an abundance of expansive foliage are apt to be natives of a humid atmosphere. Asiatic plants have been noted for their beauty, African for their fleshy, succulent leaves, and American for smoothness of their foliage and the singularity of shape in flower and fruit. Plants indigenous to polar or mountainous regions are generally low, with small, compressed leaves, but flowers large in proportion. Australian plants are distinguishable for small, dry, shriveled leaves. In Arabia, they are low and dwarfish; in the Indian Archipeligo, shrubby and prickly.

Shrubby plants of the Cape of Good Hope, and Australian plants, exhibit a striking similarity, also the plants of Northern Asia and America. All this variety is undoubtedly the result of the food taken up by the roots or foliage, whether it be mineral or gaseous nutriment, governed, of course, by climatic influences.

It is a very well known principle that the grain, and other fast growing plants used for food by man and animal, require a rich, strong soil. By rich soil, we understand a soil possessing an excess of the decomposed organic matter that enters the composition of the plant in its new combination.

"The soil and the air upon which plants live, and by which they are everywhere surrounded, supply a variety of materials—some likely to be useful to the plant, others not." Hence, to know what elements a plant can use as food, we must know its chemical constituents and its general composition. If we decompose or burn a plant, we find it all dissipate, and pass off into the atmosphere, except an earthy residue, termed ashes. Plant food must contain carbon, oxygen, and hydrogen, in some form or other. Plants absorb more water than any thing else; hence the most ignorant cultivator applies water, not knowing the elements

of his application or its effects. Water is sometimes taken up by the leaves as well as the roots, and a sprinkling of the wilted leaves often revives a drooping plant very much sooner than the same effect could be obtained by an application to the roots alone. Carbon, so essential to plant growth, is insoluble in water, and cannot be taken up by the plant in however minute particles, and can only be appropriated through the leaves, in the form of carbonic acid gas. This gas, so destructive to animal life, when taken into the lungs, is innocent and very agreeable when taken into the stomach from the sparkling soda fount, or agreeable mug of cider.

The animal moves about in search of food ; not so the plant. Every breeze that stirs the foliage brings the new supplies of the necessary combinations for its growth and maturity, and the ripening of its fruits. Stagnant ponds are fruitful sources of malaria, but in these we find the pond lily and similar aquatic plants, that absorb and feed upon that vitiating product, thus rendering the air more pure in the vicinity.

The elements composing the framework, as well as the general composition of the entire vegetable structure, are the same, whether it be the forest tree or the border flower, only in different proportions and quantities. Did space permit to explore it, without being tedious, a rich field is open to our investigation in the food stored up in the various nuts and seeds for the nutriment of the embryo plant; and a counterpart is found in the yolk of the egg, retained in the body of the young chicken for its nutriment until it can pick its own food. So the embryo plant is fed by the nutriment furnished by the parent until its organs are developed, as in the young chicken, to gather its own food from the earth and air.

Thus we find that life is known to our senses by its effects, though science, in its best discoveries, cannot inform us what it is. The most casual observer will find an astonishing similarity in the anatomy, physiology, constitution, etc., of the vegetable and animal creation—each having organs of respiration, digestion, assimilation, circulation, motion, heat, and a still more obtuse but equally important characteristic, that both work and are endowed with a healthful organism under the influence of light alone. The solar ray that colors the crimson petals of the dahlia or the rose, supplies the carmine to the blood. In plants, as in animals, when the material is brought to the proper place, growth takes place, or waste of the organism is renewed. Both present remarkable instances of the power of reproduction, though this is more marked in plants than in animals. In a great majority of cases, a single bud is possessed of all the organs that are necessary and requisite for the reproduction of an entire and perfect individual. Some insects have the reproductive power to such a degree as to reproduce a fang, or even leg, when accident deprives them of so useful a member.

Living, growing vegetation, as before stated, will feed on impure air, decomposing animal or decayed vegetable matter, changing them by their peculiar functions, again to make a part of the animal organization ; also various forms of mineral matter are taken, and prepared and endued with

power to enter the organic system of nature. Some of these fairy vegetable creations we might almost imagine endowed with a spiritual existence also, or, as the poet expresses it:

"There are spirits of flowers that have blossomed and died,
Long since in the garden, its beauty and pride;
Yet they rise from corruption in robes new and bright,
As vision-like phantoms, all spotted and white.

"Gay bodies we know have gone down to decay;
With the winter's first breath they have withered away—
But a change has come o'er them, and dream-like and fair,
The features that marked them they'll once again wear.

"The same wondrous tissue, the outline and grace
Of each tiny leaflet and blossom we trace—
True types of ourselves whose poor bodies shall rise
From the grave of corruption, the heirs of the skies."

ORNAMENTAL AND LANDSCAPE GARDENING.

Illinois State Horticultural Society:

GENTLEMEN—Through fault of the mails I have but now received notice that I am expected to write an essay on "Ornamental and Landscape Gardening."

Scarcely had I read the notice when *hortus*, garden, and *colo*, I till, came into my mind. I wish I had power to make that individual, that is, make every farmer and gardener in this western empire State feel the individual loveliness of landscape gardening. I have neither time nor inclination to write a long article on this prolific topic, but will just try to see if we can not make this matter suited to the circumstances, the tastes and pleasures, of those who till the soil.

The true principles of ornamental gardening are three only—perspective, light and shade. Think what your grounds will be fifty years hence, and then form, group, open, and establish accordingly.

A clump of trees must break the monotony of the plain, or too extensive lawn. Evergreens and walnuts must break the glare of prairies, or champaign, and cast into shade such objects as may be too noticeable. In a word, don't torture Nature, but chasten her. Never straiten a stream of devious water; rather help it in its windings, unless it materially interferes with some more cherished object. Avoid every thing stiff and formal; and let your trees and shrubs appear in their own form and manner of growth. If you cannot make your pruning-knife behave itself in your pocket, throw it away, or give it to some boy fond of fishing, that you may never see it again.

For trees you need not go out of your own neighborhood; take those which thrive best near your own home; they are friends, accustomed to your soil and climate, and you may depend upon their good behavior. Exotics—foreigners—may do well; treat them with all courtesy, urbanity

and generosity; but still as strangers, for after years of trial they may fail you.

But why go abroad when we have so much to try at home? There are in this country some one hundred and forty varieties of forest trees, and in Europe but thirty-seven. We are said to have fifty-three species of oak, seventeen of pine, fifteen of walnut, and eight of maple; and every body knows, (whose taste is not vitiated,) that the hard maple (*Acer saccharinum*) is the handsomest tree the good Lord ever made. With such a world of materials, is there the shadow of an apology for us to live without ornamental trees, shrubs and flowers? Why, it's a sin. For a far less crime Ananias and Sapphira were struck dead!

GEO. W. MINIER.

Flower Dale Farm, Dec. 5, 1873.

THE SNYDER BLACKBERRY—ITS HISTORY AND QUALITIES.

It was found growing wild on Henry Snyder's farm, near La Porte, Indiana, in 1851. He planted it in his garden, where it has been growing and producing fine, luscious berries every year. About the year 1860, the La Porte Horticultural Society recommended it as the best berry known to them, and named it the Snyder. I have fruited it the last three years, with perfect success. While the last winter, under the same conditions, the Kittatinny was killed to the ground, the Snyder produced a full crop; many of the terminal buds bloomed and produced fruit. We claim for it the following qualities: Great hardiness and productiveness, (has not winter-killed for twenty-two years), fine flavor, and no hard, sour core, so common to other varieties; strong, upright canes, with short, stout laterals; ripening its terminal buds perfectly; sheds its leaves early and clean; the foliage is a dark, rich green; the canes have only half as many thorns as Kittatinny, and they are so nearly straight they do not hold the clothes of the pickers; the color of the berry is a glossy black, and when it is black it is ripe. In size it is about the same diameter as Kittatinny, but is one-eighth shorter, and ripens one week earlier. The bloom is nearly all out at one time, consequently the harvest is short, the berries being picked in from fifteen to twenty days.

I. R. GASTON.

Normal, Ill., Dec. 13th, 1873.

AGGRESSIVE PARASITISM OF FUNGI.

BY T. J. BURRILL, PROFESSOR OF HORTICULTURE IN THE ILLINOIS INDUSTRIAL UNIVERSITY.

It long has been and still continues to be a disputed question among horticulturists and botanists, regarding diseases of plants accompanied by fungous growth, as to whether the latter is the *cause* or the *result* of the disease. Like other questions, open to protracted debate, there are, undoubtedly, two sides to this one. Cases are not all alike. Sometimes disease and even death, attributed to this cause, take place before any

evidence of fungi make their appearance, while under other circumstances the reverse may be true. But a greater source of difference of opinion comes from the want of fully understanding the habits and laws of growth in general of both kinds of plants, the afflicted and the afflicting, and in particular the special habits and laws of growth of the individual species concerned. As an illustration from the animal world we may take two snakes that look very much alike, and that, to common observers, would be pronounced to be the same, while their bite upon these very observers would produce strikingly different effects. One is harmless, the other deadly poisonous. The illustration, however, does not end here. The poisonous nature of one of the reptiles is proved only so far as experiment has been tried; for while there is the above difference between them in regard to their effects upon man, their bite may be in no wise different in its effects upon swine. It is even possible that the harmless and poisonous natures may be exchanged in regard to some animals bitten by them. Thus the question becomes a complicated one, and can only be settled by having at command all the facts in the case. Even upon the same animals the effects may not always be the same, for the conditions of the system change in such manner that disease is caused at one time, and at another the influence is entirely thrown off. Now, knowing these and similar things to be true of animals, does it not seem probable that like complications may be found among plants? If it is admitted that much close observation is necessary in order to arrive at truthful conclusions among beings which are well known, and whose actions are easily seen, what must follow as a necessity when we deal with comparatively unknown forms, whose workings are in secret, and of whose mysterious energies we know little or nothing? Is it a wonder that men should have disagreed about the habits and influences of living structures, too small to be seen at all by the unaided vision, and too subtle in their operations to be discovered except by skillful and laborious research? Such, however, are the most of the parisitic fungi. Thousands of these minute forms find lodgment upon a single leaf, yet their presence is unsuspected by the cultivator, who wonders and worries over the sickly condition of his plants. By the aid of the microscope they may be seen and studied, but no one sees them bite, neither are poison sacks found at the base of horrid teeth, by which the mischief is accomplished. It is therefore necessary to patiently watch the effects of their growth in the special case at hand, as well as to know, as fully as possible, the general conditions and requirements of both the healthy and diseased states of all the organisms under consideration.

Now, in a general way, it is well known that the conditions of growth are very different between fungous and other plants. They seem to be the opposites of each other. With rare exceptions, all other plants are dependent upon light for their existence. Deprived of sunlight, they speedily perish. The potato, stored as it is with prepared material, sprouts in the cellar, but only attains a feeble, useless development, adding nothing to its substance. House plants, provided with the best soil, and receiving the best attention in other respects, fail utterly with the window

curtains down. Even field crops languish in cloudy weather, when other conditions are best suited to their growth. How different with the fungi! Mushrooms are splendidly grown in the catacombs of Paris—those underground caverns, where darkness perpetually reigns. Moulds luxuriate in the darkest cellar, perfecting their fruit without a ray from the sun's sustaining disc. Thieves and evil-doers excepted, the fungi are the only living beings that could consistently rejoice over the entire withdrawal of light from the earth. Other plants take from the atmosphere carbonic acid, and restore the oxygen, but fungi, like animals, take oxygen, and pour forth carbonic acid. This fact alone shows how radically different the principles of nutrition are in the fungous and the other plants. The prime office of vegetation is to build up organic products from inorganic elements, and plants alone possess the power of doing this. Animals consume these products, combustion and decay disorganize and reduce them to their original status. But fungi form the exception among plants, and, like these last, are altogether destructive. Incapable of feeding themselves from the inorganic earth and air, they prey upon the elaborated products from these materials, accumulated by their accommodating relatives in the vegetable kingdom. Such are some of the peculiar characteristics of the fungi as a class. Of these there is no question as to their truthfulness; but, as indicated above, the disputed point is whether or not any of the fungi are capable of attacking, feeding upon, and so perhaps destroying other plants previously in healthy, vigorous condition, or, in other words, whether the fungous parasites really *cause*, and are not the results of, disease.

I have said the special province of vegetation was to take from the inorganic elements and manufacture the organic. Let it be noted, however, that this implies more than simple chemical combinations. The vital power of the plant, aided by sunlight, rends asunder these combinations, overmasters the usual chemical affinities, and, in spite of their attractions, builds up its tissues. But the moment its life is gone, these affinities again triumph, and decomposition begins. Now, fungi hasten the ruin, apparently lending their life force to augment the power of the natural attractions of the particles for each other, as wolves follow the herds of buffaloes, to make quick work with the lame and weakened ones that linger behind. The vital force stands guard alone against the destroyers. Is it not likely that it, too, shall at times be defeated? Remembering that the parasite has, as well as the host, this mysterious endowment of life, may not its forces, in many engagements, sometimes outmarshal those it seeks to destroy and rob of their treasures? Advantages are seized upon, favorable conditions for the attack are improved, or in equal ordinary combat swift and sure destruction follows the dread onslaught of the parasitic hordes.

Abundant evidence supports this idea. Numerous well-attested cases are at hand, so that to one who examines carefully, and is prepared to properly estimate the evidence before him, the conclusion is irresistible that the fungi do *cause* disease in structures, which, but for their attacks, are healthy and vigorous. When weakened by any cause, of course there

is the more danger to the debilitated party. In damp, dark weather, unfavorable to general vegetation, but well suited to fungous growth, the latter has the advantage, and is not slow, as is well known, to improve the opportunity. Subject to some of the varying conditions referred to in the first part of this paper, the following are examples of diseases produced by fungous plants. In these cases, as in hosts of others, it can be readily demonstrated that the parasites are the cause, not simply the accompaniments, of the injury.

Bunt or Smut in Wheat, showing itself in the grain, and reducing the whole interior to a black, pasty, or powdery mass. This is caused by the spores of *Tilletia caries* being sown with the seed, and though not showing its effects, the plant really grows with the wheat from the beginning. The practice of washing the seed in brine, and afterwards drying it with lime, is an almost effectual preventive. Simple washing with water, or thoroughly blowing in the windmill, must aid. *Rust* of the stems and leaves of small grains generally, but of wheat especially, is due to *Puccinia graminis*, whose spores form the rusty powder, which is sometimes so abundant about harvest time, staining the workmen's clothing. Another kind of spores are afterward produced, which are nearly black. These last stick to the straw during the winter, and doubtless constitute the germs of the next year's generation. Washing the seed can do no good in this case, while carefully carrying away the straw, burning the stubble, and cleaning the corners of fences, etc., of all grass-like productions, may prevent the attack. The full history of this parasite has not been made out, but every farmer must have noticed that its growth depends very largely upon the weather. Hot sunshine, broken at intervals by showers of rain, load the air with vapor, rendering the atmosphere "muggy" and unsuited to ordinary vegetable growth, but well adapted to the *Puccinia*, which quickly destroys the crop. It was present before, but not active enough to become very injurious.

The Rot of stone fruits, causing them to shrivel upon the tree, and soon covering them with a gray mass of dust, is the sure result of *Oidium* (Torula) *fructigenum*. Any one may satisfy himself as to the action of this fungus by simply wetting or puncturing slightly the surface of a healthy fruit, and placing upon it some of the dust from an affected peach. The experiment is almost sure to suceed, though occasionally, in dry, clear weather, it may miss. Examining with the miscroscope, twenty-four hours after the sowing, the substance of the fruit, the threads of the fungus will be found in abundance, and in two more days the unaided eye easily detects the mischievous work. Theoretically and practically the prevention of this disease is to ward off, as far as possible, the insects which puncture the fruit, and to remove cautiously every rotting one as soon as discovered. These may be buried in the ground or burned.

The Fire Blight of the pear needs more study, but the *Leaf Blight* of pear seedlings certainly, and large trees probably, is from a fungus whose name is unknown to me, but which is similar in habit to the puccinia above mentioned. Beyond what is commonly known, however, there is no certain remedy. These pear diseases shall receive attention hereafter.

Potatoes rot from several causes ; but that which causes at times such widespread injury to the crop is *Botrytis* (*Peronospora*) *infestous*—a white mould. This first attacks the leaves, then follows down the stem, and finally destroys the tuber. Some varieties are more liable to suffer than others, and as in the wheat, much is due to the weather.

The *cutting-bed fungus*, the plague of the propagator of plants, is a species of *Stilburn* ; at least this is true in the green-house of the Industrial University. I believe the species we have is undescribed. The cuttings "damp off," as the gardeners say—a single day or night often witnessing the death of hundreds of previously healthy slips. The threads of the fungus spread with astonishing rapidity through the damp sand, and, as if by magic touch, cause the stems and leaves to decay. Fortunately, this can be controlled by reducing the temperature of the bed, and by attention to the light admitted. From experiment thus far, it seems the latter is really the important thing, as a well lighted and ventilated bed is rarely attacked.

Hundreds of other instances like the above force themselves upon our observation. Probably no plant or animal, living or dead, really escapes. We ourselves become the prey of these offending creatures ; and before we shall fully understand "all the ills that flesh is heir to," we shall be compelled to give them more study, more thorough investigation.

CRITICISMS.

The following has been handed to the Secretary for publication, and as fair criticism, given in no hostile mood, is wholesome and may be beneficial, this is allowed a place, in the hope that any valuable hints it contains will be well considered by the officers and members of the Society.

[From the *Chicago Tribune*.]

"MRS. SAM JONES GOES TO THE MEETING OF THE ILLINOIS STATE HORTICULTURAL SOCIETY.

"Sam had a great desire to attend the annual meeting of the State Horticultural Society, to be held at Champaign ; and so he arranged his work, and invited me to go with him. We got there in the middle of the night. It was raining hard, and we had to go two blocks to reach our hotel, but the landlord gave us a room with a stove in it, and had a fire built, and we were soon made comfortable. Some landlords know how to keep a hotel, but not all of them. When people come in cold and wet from the train, in the middle of the night, they know how to appreciate a good warm room to go to bed in, and, in such a case, they feel as though they were at home.

"We had breakfast at seven o'clock. There was coffee, steak, sausage, fried and boiled potatoes, and buckwheat cakes, all of which were nicely cooked ; and Sam remarked that the cook must be a farmer's wife, for there was no drenching of the steak with pot-grease and flavorings ; and I afterwards learned that the host and his wife were farmers up to within two or three months. With such kind of cooking, I knew that Sam would be willing to stay during the entire term of the meeting.

"After breakfast, we went over to the Industrial University, which is about a mile from the hotel. What could possess the Trustees to locate the building so far out of the way, when they had such a nice location just south of the old college building, and within an easy walk of the depot, is beyond comprehension. A citizen told Sam that it was to please a real estate ring, that the thing was thus. If that is true, these men should be made to move every brick to where the building should have been located. A man told us that for this and other things the Legislature has turned the old Board of Trustees out of office, and put a new set in their places, and made other changes in the management, and that now things were in a very good condition. The new building is a large, massive, warehouse-sort of structure, more solid than pretty; and I was disappointed in its appearance, for I had been told that it was something very fine. A couple of more feet in height in the basement, and a little more taste in the elevation, would have added very much to its appearance; but it is solid, and looks as though it had been built for all time. And yet it was a bad plan to use dry pressed bricks for such a purpose, as I fear they will begin to crumble as the ages begin, and may in time create a bother. The inside is plain, and, so far as I could see, the rooms do very well; but I do not pretend to know much about the inside of a college.

"At 10 o'clock, the Horticultural Society were called together. There were about sixty members, and among them *only three or four women*. There were so few women that I was almost sorry that I had attended. Just to think of sitting for four days among a roomful of men, and less than half-a-dozen of us women!

"The first thing was an address of welcome from the head of the Faculty, Dr. Gregory. The Doctor is a very pleasant speaker, and made the Society very much at home. He thought we should have warm, nice weather, and our coming brought up the mild zephyrs from the South, and that would insure a pleasant time; and he hoped that we would look through the building, the library, the classes, and make ourselves at home during our short stay. The President then read his opening address, when the meeting was ready to proceed to the regular order of business.

"It may be that all the arrangements of the Society are well enough; but it appears to me to be too exclusively in the hands of the men—just as though our sex have no taste for, or right to, the garden, the small fruits, or the flower garden; for all of these are embraced in Horticulture. I looked over the programme, and could not find the name of a single woman on the list who was to take part in the proceedings; and, during the whole of the three days' session, not one of us females was invited to say a word or take any part in the proceedings. I expected better things of the Society than this, and especially of its venerable President; but it is possible that age in all cases does not bring wisdom. At least it appears to me that it would show a little wisdom in this Society to invite the ladies to take a part in it. Not that I would like to make a speech, or write an essay, but there are others that could do so.

"The first day was spent mainly in reports and the reading of essays; and in the evening we had a paper on Forest Tree Planting, that got up some pretty sharp debate. It appears that, for the past twenty years, there is a party who have been predicting that in ten years all the timber on the American continent would be used up, and that it would 'become barren like Palestine' and a country called Sarah, or Sahary, where the old settlers cut down all the old forests for building and for fuel, and in consequence people had to move west in order to get timber for farming purposes; and now the

western forests are sinking away like the morning dew. According to the essay read, the railroads would be out of ties in just eighteen years, and would have to stop business, as the present stock would last ten years to cut from, and the ties would last eight years longer. This will be the result unless every farmer goes to planting trees for this purpose, in order to supply the demand. If this is so, the monopoly question, as far as the railroad question is concerned, is in the hands of the farmers, and they can withhold ties from all the roads that will not come to terms on freights and fares. This may appear to be a new solution of the question, but it looks to me as one having great weight.

"Some of the speakers did not believe in the ten-year theory; but we had had two decades of the prophecy, and it had not as yet come to pass; and such a prospect was in the far-off future—say a thousand or two years—as Illinois to-day had more timber than it had twenty years ago. One is liable to become undecided in the midst of such conflicting arguments; and, when we were going back to the hotel, I asked Sam what he had thought of it, and if we were really in danger of becoming dried up and going to become a sandy desert, as did the countries mentioned in the essay. Not in the least, he said; for the old forests may be cut over every thirty or forty years, and the new growth is better than the old. And he suggested our farmers would find that a crop of forest trees, for ties, wagon and implement timber, would be profitable.

"The evening was wet, and the attendance at the evening session was small.

"On the second day, Mr. McAfee read a paper on Bud Variation, that made a great deal of talk, and the most of the speakers took a sort of Darwinian view of the subject. I never felt so much like asking questions or making a speech in my life, and, had I been a man, I should have gone in.

"Just let us look at this kind of talk for a moment, and see where we would drift. According to this theory, the apple, the orange, the peach, the pear, and such like fruit, must have been of the most common kind in the Garden of Eden, and could never have tempted Mrs. Adam as a luxury; for six thousand years of bud variation, or 'variation from parental forms in vegetable life,' have only made the best of them tolerable, and the books say this has resulted within the past hundred years. Then, what did Adam and Eve do for vegetables and for flowers? No potatoes, no cabbages, no beets, no onions, no asparagus, or celery; and, as for tomatoes and such like, they had not the least idea. This is queer doctrine for the great State Horticultural Society, to say the least. There had ought to have been a committee of investigation appointed to look into that history, and to report the condition of the fruit crop in Eden, as compared with the crops of the present time. If they did not have Baldwins, Greenings, Winesaps, and Willow-Twigs, it is possible that they had varieties just as good, and it is possible that all those valuable sorts were lost in the dark ages.

"There is a wonderful field of investigation in this direction, that should be looked after; for if garden vegetables are the creation of the market gardener, and flowers of modern florist, and fruits are molded and colored, and made luscious by the State Horticultural Societies, we should know it, and thus settle some small matters of history, as well as of vegetable physiology.

"In some respects, I am glad to have attended this meeting, and in others I am not. To hear these contradictory arguments, one is at a loss to know just where the truth lies; and to me it is a question if these discussions, after the reading of those heavy

papers, is not damaging. The essay is all straight, clear sailing, and the facts are ably set forth, and one cannot help admiring the theory, and would naturally fall in with it. But, in the discussion, up pops some fellow, and goes at the essay with a long list of facts and theories, and you begin to doubt how it is. And so it was in regard to the papers on forests and bud variation.

"I suppose the oaks grow just as they did 'in the beginning;' but as to apples and such like, I cannot say; though I would like to know if the apples of Eden were just like our Red Junes, Early Harvests, and Winesaps. That would be a great consolation.

"The books tell us that the cultivated apple came of the Siberian crab; but I don't believe it, for that would at least lead to the presumption that the Garden of Eden was located in Siberia, which was probably not the case. But, as there is no mention of garden vegetables in Eden, it is probable that they came from different parts of the country, as we all know that the potato and the pumpkin are native Americans. If the Society would admit the women, their natural curiosity would lead them to investigate some of these matters, and set them right before the people.

"In the afternoon, we had the dedicatory exercises of the College. The heavy part of this fell to the Regent, who made a two-hours' speech. It has occurred to me that there ought to be a Chair of Condensation in every college, and that it should follow the Chair of Rhetoric; that each student who studied the latter should go through the condensing department, in order that his sentences should be condensed. I believe that used to be taught in the old classic schools, at least those of a military turn, as the old army reports were remarkably condensed, some much more so than the modern telegrams. Cæsar, in his report of a great battle, gives us a very fine specimen. By this process, a two-hours' speech could be condensed into one-half an hour; and some speeches and some sermons that I have heard might have been reduced to ten or fifteen minutes, and then the reader would not be at a loss to understand the subject. This is demonstrated in boarding-houses where they serve up weak tea, thus compelling the lovers of tea to drink a great deal of water to get a little tea.

"After the Regent, the Governor spoke for fifteen minutes, and said a great deal; at least so thought the members of the Board of Supervisors, who voted to repudiate the college bonds.

"The Governor told them that if the county did not pay the bonds, the State would, and then put the College where it would do the most good. The fact is, the Governor has a way of saying something when he talks. There were others who made short speeches, and every one went away pleased with the occasion, and, as the Governor said, there was nothing but the shadow of the Board of Supervisors that stood in the way of the onward progress of this great State institution.

"In the evening, the Society met at the Opera Hall in the city, as the weather was rainy and sidewalks slippery.

"Prof. Riley gave a talk about the codling moth and a plant louse that infests the grape vines. But the best way for the orchardist and the vineyardist to get a full report of Mr. Riley's remarks is to send a dollar to O. B. Galusha, the Secretary, at Morris, become a member, and thus obtain a copy of the reports. It will be a dollar well invested. The State gives the Society $2,000 a year to pay for printing and other expenses, and this, with the membership fees, keeps the Society in running order.

"I expected to see lots of apples, cider and cider-vinegar, dry and canned fruits, but was sadly disappointed. The members said the fruit crop was such a failure, that they had little to show.

"I was surprised to hear that the making of cider from the sound, ripe fruit, and vinegar from all of the refuse, had doubled the value of the orchards that pursued this course of management. We have a nice orchard, and Sam says that he will see that nothing in the orchard is wasted hereafter, and that the information obtained at this meeting will fully pay all the cost of our attendance.

"In the evening there was a hurrying up so as to get through, for some wanted to go home, and others to visit the College. There were some papers read, and then followed a discussion of small fruits and the passage of resolutions, and at half past ten the Society adjourned. This gave us half a day to visit the College, which we did. There are about eighty girls and some three hundred boys in attendance, and, with the exception of the teacher of music, all the teachers are males. This looks a little strange, but, I suppose, will be corrected in time. Then the walk to the College is a long one, but, perhaps this is a good thing to give the girls more exercise; at least the girls all look healthy and pleased with the school, as they have the same government with boys, and the same opportunities of study, except that they do not have to drill or wear the University suit. Some of the girls board in clubs, but most of them are residents of the city and board at home. An attempt was made at what was called a domestic department, but it has met with very little success. It is simply a girls' club boarding-house, and the girls that do the housework have certain wages. It was intended for the girls to do all the work, under the direction of a matron; but other labor has been found essential to success. About one-third of the boys board in clubs. The better way is to board in families, and give more attention to study, or rather devote the spare time in the library.

"The general style of dress is plain, and the students appear to be more anxious for an education than for show. I presume our girls will conclude to attend the winter term.

"MRS. SAM. JONES."

LOCAL HORTICULTURAL SOCIETIES.

WARSAW HORTICULTURAL SOCIETY.

REPORTED BY B. WHITAKER, SECRETARY.

This society has held its regular stated meetings during the year 1873, except that for August, which was omitted on account of the extreme heat of the weather. Besides the regular meetings, several special meetings were held in Hamilton.

Special subjects for written essays are designated in a card, containing the programme for the monthly meetings during the year. These subjects are arranged by a committee on programme, at the commencement of the year; the Secretary, in giving notice by postal cards through the mail, of the time and place of the ensuing meeting, states the subject for essay and discussion, so the members are advised of the subjects which will come before the meeting. This, however, does not preclude other business, or new questions being introduced.

The proceedings of the society have been published regularly in the *Warsaw Bulletin*, copies of which have been furnished to a number of agricultural and horticultural papers, other societies, and distinguished individuals.

The plan of itinerating, by holding the meetings at the residences of members, except in winter, has been found to be most approved, besides affording an opportunity to members to see the orchards and farms of others.

Many interesting discussions have taken place in the meetings, which, if they could have been printed at length, would afford profitable reading; but we have been limited for space for the essays and discussions, hence have had to condense the statements and discussions in almost every instance.

Among the subjects which have been discussed in the meetings, the following is a brief resume: Teaching agriculture and horticulture in our public schools, an essay by Dr. Charles Hay, reviewing the subject historically; reviewing the former and present conditions; European States, especially Prussia and France, contrasting them with one another, and with our own country, producing an irresistible conviction in the minds of all who heard him, of the needs and necessities of moving in this direction. Compulsory attendance of school was discussed in the same connection; it was conceded that it would be far better to be taxed for books and stationery, than for jails and prisons to punish the youth allowed to grow up in ignorance and crime.

At the January meeting, pieces of wood taken from a well of Mr. Kinkel, just dug, at a depth of forty-two feet, were exhibited; although not strictly a horticultural subject, yet one of interest, as showing the drift formation. The following statement, from Dr. Hollowbush, was made on the pieces of wood: "That they belong to the northern drift period, anterior to any definite period in the history of geology, having evidently been the work of currents of water and ice, subsequent to the primitive or Silurian age. Our vast prairies are accounted for on the hypothesis that the primitive surface was submerged by oceans and lakes; that subsequently, from causes unaccounted for, the northern drift mingled with the sedimentary accumulations, formed the present surface soil, which, mingled with mineral and vegetable matter, accounts for the inexhaustible fertility of the prairies."

A sample of peach brandy was exhibited by C. Herman, in which the rich, fragrant aroma of the peach was noticable. Three barrels of peaches in the mash made ten gallons of brandy of superior quality.

The Society held its regular meeting for March at the office of Dr. J. W. Hollowbush, on the 4th inst.

The meeting was organized at 11 o'clock—President A. C. Hammond in the chair.

Samples of apples by E. McCune, Esq., were laid on the table, among which were Canada Red, Ben Davis, Yellow Bellflowers, Russets, Pryor's Red, and others. The specimens were unequalled for size, beauty, and their perfect condition, as well as excellent flavor. Also, by President Hammond, Limber Twig, Ben Davis, Winesap, Pryor's Red, and other varieties, among which "Wythe apple," competing with the best of varieties in size, appearance, and its keeping qualities.

Letters from Hon. Fred Watts, Commissioner Agricultural Department, and J. B. Matthews, Esq., on early records of meteorological observations; proceedings of the Alton Horticultural Society, and correspondence from other localities, and seed catalogues were laid on the table. Also wine and cider, by J. F. Spitz, Dr. Hollowbush, Grover, and others.

The President called for an essay by Thomas Gregg, Esq., late Secretary, which was then read before the meeting:

HORTICULTURE IN ITS RELATION TO THE FARM.

You have assigned me the duty of writing of "Horticulture in its Relation to the Farm." There are so many points of interest in the subject, and so much that may be said upon it, that I scarcely know where to begin.

Horticulture and Agriculture are closely and inseparably connected. In the dictionary sense of the terms, they are so intimately related as to render it difficult to tell where Agriculture ends and Horticulture begins. Webster defines Horticulture to be "the art of cultivating gardens." Of Agriculture, he says, it is "the cultivation of the ground, for the purpose of producing vegetables and fruits, for the use of man and beast; the art of preparing the soil, sowing and planting seeds, dressing the plants, and removing the crops."

Thus it would seem that they both mean the cultivation of vegetables and fruits; and that about the only difference between the two is in their relation to the farm and

garden. If Mr. President devotes his farm to the growing of potatoes and turnips, apples, pears and peaches, he is an *agriculturist*. If I devote my garden plat to the same purpose, I am a *horticulturist*.

Yet custom has given a broader distinction, and has made the difference to consist chiefly in the things cultivated—calling the production of the cereals and the grasses, and the raising of the stock, agriculture; and that of the fruits and vegetables, horticulture. And this difference has been gradually widening. The owner and cultivator of the broad acres has come more and more to feel that he has no business with horticulture in its limited sense; that his labors are on too grand a scale to permit of his devoting any attention to the growth of fruits; while he is ignorant even of the existence of many of the most valuable and wholesome of the vegetables. If he can fill his barn and his cribs with a large yield of the cereals and of hay, and his meat barrels with a generous supply of beef and pork, and can drive a score or so of hogs and cattle to the city market, he is content, though his cellar may not contain even the ghost of a supply of fruits and vegetables. Mistaken notion!

Mistaken, I term it, because he has not realized the fact that he is neglecting very important and necessary branches of his calling. I emphasize the terms, and would almost say *the most* important and necessary. He is neglecting what, if rightly considered, will conserve in a high degree to his enjoyment, and yield him a large percentage of the good things of life. For what does a man till the soil, and for what does he labor with his hands, if not that he may enjoy the blessings which Providence sends as the crowning result? To my mind, there is nothing clearer than that the production of the various fruits and vegetables in profusion, and their increased use in the many forms modern science has taught us to prepare them, would conduce to the enjoyment, the happiness, and the health of the people. And I will go still further, and say that I believe it would tend to a higher mental and moral development of the race.

When we remember that an ample supply of all these things for the wants and needs of his household, can be produced from so small a plat of ground, and with comparatively so small an outlay of labor, it is astonishing that so many of our farmers neglect them. True, it has come to be admitted by all farmers of any pretentions, that an apple orchard of some sort is a proper appendage to a farm; and most farmers at this day contemplate an outlay for one, this year, or at some time in the future. And this outlay, in very many cases, is generously small; yet most farmers of means can show at least a few trees, many of them stinted and uncared for, to be sure, but capable of bearing fruit and being called an orchard.

But among all the well-to-do farmers around us, how many can show an acre, or even a quarter of an acre, of small fruits? How many have planted even a dozen Concord grapes, or half a hundred raspberries, or can show three square rods of strawberries? How many have a bed of that rich and healthful plant, asparagus, or how many have even tasted of celery or salsify? I cannot undertake to answer these questions, but we all know that the number is extremely small.

The cultivation of these things on the farm is necessary in another point of view. It diversifies the otherwise too monstrous labors of the farmer's household. To occupy a few hours now and then, in planting and pruning, hoeing and spading, and budding and grafting, gives a grateful diversity to the arduous duties of the boys on a farm, and I doubt not tends largely to render them satisfied with their calling. Every fruit or ornamental tree planted, every quart of raspberries or strawberries, every bunch of grapes grown and consumed by that household, is a rivet, so to speak, to hold its members together. And to carry the idea a little farther: every rose tree planted and tended by the mother and daughters of that household, every vase of flowers or wreathing vine, fashioned by their fair hands, is a heaven-sent blessing to draw them nearer to each other, and to purify their affections.

The pleasures and enjoyments resulting from horticultural pursuits cannot be determined by a cash value. Many of them are of such a character that money cannot purchase them. Pleasures of this character are not to be weighed by gold. Yet there is a money value in horticulture to the farmer that ought not to be lightly esteemed; his apple, and pear, and peach trees, (I say nothing about a commercial orchard), or his

plat of berries, or rows of grapes, have a money value in them of no small amount. A few barrels of apples for summer, fall and winter use, a few baskets of pears and peaches and cherries, a few gallons of the various small fruits, for canning or preserving in many other forms, with which to grace the table each day in the year, have in them an actual cash value of no mean proportions. And he who has to provide for the wants and needs of a family, on a farm or elsewhere, who will produce and use them generously, will verify this assertion.

But I must close. To every farmer, then, that I might hope to influence, I would say, first, plant an orchard, not of apples alone; but add a few of the hardier and better sorts of pears, peaches and cherries. Then plant a row or so of raspberries, a few rods of Wilson's strawberries, adding as many of the other small fruits as taste and a sound judgment will warrant; then crown the whole with a well laid out lawn, dotted with evergreens and other ornamentals, and here and there a flower-bed, and you and your family will be richer, healthier, happier, better, for the expenditure.

The essay was commended as being eminently pertinent to the subject embraced.

Mr. B. G. Grover feared that if the farmer engaged in all the pursuits named in the essay, some of his irons would burn.

Dr. Hollowbush thought the essay embraced the right ideas; that the vocation was of the most healthful kind; that nothing was so well calculated to refine our natures as working among small fruits and flowers.

Mr. Chittenden thought small fruits did not amount to much; that strawberry culture had pretty well run out, and referred to the time when everybody was growing them, and no sale for them, and that there was no money in them.

The President combated the idea that there was no money in small fruits; that the meaning of the essayist was misunderstood where he says there is a money value which cannot be estimated.

Mr. Hammond spoke of the pleasure of the cultivation of small fruits and their inestimable benefits to health, contributing largely to the enjoyment of life, to say nothing of the profits.

W. N. Grover agreed with the essayist, and elucidated the subject with appropriate remarks.

On motion, the essay was ordered printed, together with the proceedings.

The President then called the questions: "To what extent is clover grown? Is it usually sown for pasture, hay, or as a fertilizer?"

Mr. Bliss did not think clover was grown very extensively; that which was grown was mostly for pasture. He spoke of its excellent qualities and adaptation as pasturage for hogs, cattle, sheep and horses.

B. G. Grover corroborated Mr. Bliss' statements, and added that it is valuable hay where it is properly handled. He had cut successive crops two and three times a year, off the same ground, for five years.

Mr. Hathaway said clover should be more extensively grown as a fertilizer, rather than for hay or pasturage; he thought that there were but few fertilizers used in this section other than barn-yard manure, and that was poorly utilized; that our soils are impoverished by long-continued croppings, without a return of any fertilizing manures; would suggest turning under clover as the most ready and cheapest mode of renovation for

over-cropped lands; he thought clover would run out in two years if the ground was not re-seeded by itself.

Mr. Glover thought his clover, the Mammoth variety, did not run out; it had stood five years or more, yielding well.

President Hammond agreed with Mr. Hathaway that clover was a biennial plant; would run out if not re-seeded by itself.

Mr. McCune esteemed clover for pasture; it was good hay; half timothy for horses was preferable. He spoke of clover running out under certain conditions.

It was conceded by all that clover was eminently adapted for pasture and hay, and unsurpassed as a fertilizer.

The chair announced the subject of subsoiling.

Mr. Bliss said, as far as his observation extended, subsoiling was only partially practiced.

The question was raised, What is subsoiling, or in what method of turning up the substratum of soil did it consist?

Dr. Hollowbush gave a definition of subsoiling. Some think deep plowing, others, one plow following another, and others, turning up the substratum or hard pan. All the above modes appear to be more or less in use, as the means and occasion suggest to the operator.

The state of fruit buds and trees was announced.

Mr. Hathaway was confident he had live peach buds on a tree sheltered by the house.

Cuttings were exhibited to the Society, which gave some hope that the wood, in part, at least, is not killed. It was generally conceded that owing to the continued cold weather, it is next to impossible to make satisfactory examination. Much of the wood is reported hurt, and much of it killed.

Mr. Brown, of Hamilton, reported peaches in a bad way; pears, mostly so, with a few exceptions, as Flemish Beauty, etc.; young peach wood looking well—apparently unhurt.

Apple trees—Mr. Grover reports injury from frost, in cracking and splitting the trees; fruit buds all right; some cherries apparently good, others killed; Catawba vines killed; Concord and Clinton partly good. Hathaway had no trees split by frost—buds good. President Hammond reported Rambo, Winesap, and some other tender kinds of apple buds killed, otherwise apple buds in apparently good order.

A package of cions from Russian apple trees, from the Agricultural Department, Washington, was distributed to the following persons, by order of the Society: Dr. Hay, Hoppe, Spitze, Hollowbush, McCune, Bliss, Hammond, Willis, Hathaway, Brown, Chittenden, Grover, and Grover.

Apples, cider, and wine were then tested, eliciting various commendations. McCune's Bellflowers, Canada Red, and Pryor's, as well as Hammond's, were equal to any that can be produced. In point of size, flavor, and appearance, no other region of this State can produce nicer specimens.

Dr. Hollowbush not only made the members of the Society feel welcome, but showed that his experience and observations in relation to horticulture and the objects of the Society, are of no ordinary significance.

The May meeting of the Society was held on the 6th inst., at the residence of B. G. Grover, which is a delightful situation, on a bold prominence of the bluff, overlooking the Mississippi river, and commanding scenery grand and pleasing to the eye.

President Hammond called the meeting to order at 2 P.M.

The minutes of last meeting being read and approved, the President announced the question, "Should we encourage a greater consumption of vegetable food?" Dr Hay, being the essayist for the occasion, came forward and entertained the meeting with an able and interesting address, which showed that much careful thought had been bestowed on the subject. The address was listened to with marked attention, and elicited the following discussion:

Mr. Hathaway—The subject for our consideration being, "Should we encourage a greater consumption of vegetable food?" appears to me a question of hygiene. If a greater consumption of vegetable food would add to the health, strength, and happiness of the people in this vicinity, then we should, by all means in our power, encourage it.

In the first place, location, climate, etc., is to be considered. Men require different food in different climates. The Esquimau would not long survive as a vegetarian; the Asiatic would be destroyed by a diet of flesh and oil; but as we inhabit the temperate zone, neither of the extremes apply to us. A man is an omnivorous animal—a mixture of animal and vegetable food would here seem most proper.

Let us examine a few results. I have observed closely some people who refused meat of any kind, and found those who made use largely of eggs and milk—the only two things that contain all the elements of the human body—enjoyed excellent strength, health, and fair complexion, indicating a full supply of proper sustenance. On the contrary, those who confine themselves to vegetables alone were sickly-looking, and greatly lacking in physical strength.

Before the deluge I find no account of the ancients eating meat. (Gen. 1, xxviii.) Herb bearing seed and every tree bearing seed, or seed in the fruit, was men's food, and perhaps that is one cause of their long lives in those days.

It is a fact too notorious to require argument here, that people living on bread and meat mostly are more bilious, more subject to fevers, are less healthy, and do not attain to the ages of persons making use of a more mixed diet.

By a wise and beneficent arrangement of nature, a great variety of fruits and vegetables mature at a time when people are exhausted by the summer heats and toils of the season, the system requiring just such sedative, acidulated and cooling properties as they contain. A free and judicious use of them is plainly indicated by the requirements of the system, and adds largely to the comfort and pleasures of life. Their use,

therefore, should be strongly recommended to all classes and their most extensive production encouraged.

W. N. Grover spoke on the question of a mixed diet, but his remarks escaped the notice of the Secretary.

Mr. Gregg agreed with the general tenor of the essay; thought that the use of fruits, such as apples, as an article of diet was not dwelt upon as much as he had anticipated it should be. Thought apples contained as much nutritive properties as potatoes.

The Secretary stated that it was supposed that the working classes in the cities and towns might, by increasing the use of apples and vegetable food, lessen their expenses, as well as promote their health, to the advantage of themselves as well as the producers of fruits.

Dr. Warner said hearty men require more solid food; that to use mostly fruits and vegetables would require more time to eat, etc. He spoke of the Germans in his native country being healthier than in this country; that the German takes time to eat, while the American eats too fast and don't take time to eat right. The German don't eat meat as often as the American, once to three times a week being an average.

Mr. Herman thought the German must, in this country, adopt the ways of the American; the climate being different here, he must eat meat more than in Germany.

The Secretary can give only a brief synopsis of the several speakers' remarks.

The question was announced by President Hammond: "What one variety of apples combines in the greatest degree the three following conditions: bearing qualities, keeping, and commercial value?"

The following varieties of apples were presented and laid on the table:

President Hammond—the Wythe apple, in good condition, Ben Davis, and Willow Twig, sound and perfect.

By E. McCune—Ben Davis, Winesap, Ladies' Sweeting, Pryor's Red and Canada Red, all of good size and in perfect condition.

By John Peyton—Ben Davis and Willow Twig, large size, averaging twelve inches in circumference, and weighing eleven ounces.

By C. Willis—Rawles' Janet, Willow Twig, and other varieties, names not given to Secretary.

By W. S. Tyree—Rawles' Janet, Willow Twig, and seedlings promising of future interest.

By F. Pedrit—Ben Davis, from the orchard of John Morrison, large size, fine apples.

Wine and cider by the host. Also samples of cider by Willis and Hammond.

Alden preserved fruits, and samples of fruits from the American Fruit Drying Company, at Loudon, Tenn., by a similar process; all of the foregoing were presented for examination and testing.

It would be difficult to say any thing more than has been said of the perfect condition of the apples presented, fine flavor, size and appearance.

Beet seed, from the Agricultural Department, and new kinds of seedling potatoes, the Early Vermont and Compton's Surprise, from Briggs & Sons, New York, were laid on the table.

The question was then argued what one variety of apples combined in the greatest degree the requisitions of the question.

The members participating in the discussion were Messrs. Grovers, Hathaway, Gregg, Peyton, Herman, Tyree, Hay, Warner, Willis, Hammond, and the Secretary. It was decided that the Ben Davis apple met these requirements more fully than any other variety. Willow Twig would stand next, according to the remarks of those speaking on the subject.

It is proper to observe here that the Ben Davis apple grown in this locality is not the leathery, tough, tasteless apple which it seems to be in other localities, but is a fine, handsome, large apple, of uniform size, and although not the finest flavored apple on the list, is nevertheless a very good apple, and leads all others in bearing and keeping, and beats every thing in the market. It is believed by some that the soil of the white oak clearings, having a more or less substratum of limestone, has something in favor of orchards. This is more especially so, commencing immediately south of Warsaw, along the timber ridges; at all events, the Ben Davis is grown in its greatest perfection in these localities. The apples before the meeting were noted for their size, beauty, flavor, and perfectly sound condition. We shall not be disappointed to witness apples of the same varieties exhibited at the June meeting.

Cider presented by Messrs. Willis and Hammond was good, showing the benefit of using sound apples and new improvement in its manufacture and keeping.

Some new members were added to the Society's list, and from the interest manifested in the objects and benefits of the Society, there is reason to hope that its efforts in behalf of horticulture will keep pace with the progress of the times.

The thanks of the Society were tendered to Mr. and Mrs. Grover, for their kind attention and hospitality.

On motion, the meeting adjourned to meet at C. C. Hoppe's, the first Tuesday in June.

The June meeting of the Society was held at the residence of C. C. Hoppe, Esq., the 4th inst. All the officers of the Society were present, and in addition to the members in attendance were the following distinguished guests—Judge Hanan, of Clark City, Mo., Dr. Wm. LeBaron, State Entomologist, O. B. Galusha, Sec. State Horticultural Society, John S. Johnson, Esq., of Wythe, Frank Dallam, editor of the *Bulletin*, and Mr. Rutledge, of Ohio.

President Hammond called the meeting to order at 11 o'clock. The minutes of the May meeting were called for, read, and approved.

A communication from the chief Signal officer of the army, inviting the Society to appoint a committee of correspondence with the Signal Service, was laid before the meeting, with some remarks in relation to the

prospective benefits to commerce and agriculture, and the interest of this Society in availing itself of the opportunity to keep posted in the progress of the Signal Service.

Dr. Hollowbush favored the objects of the communication, and moved that a committee of correspondence be appointed. The President announced the committee as follows: B. Whitaker, Dr. Hollowbush, and Dr. Hay.

President Hammond then invited Dr. LeBaron to address the Society upon such topics related to horticulture, and the insects infesting fruits and the crops, as he deemed would be of most interest. Dr. LeBaron responded in the following address:

"It is the nature of horticulture to draw into its ranks people of culture and refinement. Many men who are now in the midst of the whirlpool of political ambition or mercantile speculations, look forward to the time when they shall retire from this turmoil and excitement, and spend more peaceful days and more quiet nights, amidst the more simple and healthful influences of nature. Happy will it be for them, should this time ever arrive, if in the meantime they have not lost the capacity of enjoying these natural and innocent pleasures.

"I do not mean to be guilty of the folly of maintaining that the life of the horticulturist is all luxury and romance. He must often expose himself to the midday sun; he must follow the plow and shovel manure. There is a great deal of rough and coarse work that underlies and precedes the rich and beautiful fruitage. But the work is healthful, and the fruits are the most refined and exalted of nature's products.

"It has often been remarked that it is difficult to conceive that he can be a bad man who takes pleasure in the cultivation of fruits and flowers. The selfish rich man may indeed take pride in having a fine garden, and he may spend much money in having it kept in order; but I do not call this man a horticulturist. He may take pride in walking through his garden and showing it to his visitors, but he does not take pleasure in living and working in it. If his mind is intent on low and selfish aims, he will be likely to leave his garden, or retire to its remotest and darkest corner. It is related that when Nero was plotting the destruction of the greatest and best of the Roman citizens, he walked through his garden, not to admire its beauty, but to indicate his wicked purpose, by knocking off with his cane the heads of the tallest poppies.

"In the beautiful allegory of the garden of Eden, our first parents are represented, in their primeval innocence, as being surrounded by fruits of every kind, and these seem to have constituted their only food, and it was the unadulterated juice of the grape which the Great Teacher promised to those who should become his guests in the Paternal Mansion.

"The views above expressed will be corroborated, if we look for a moment to the class of men who have taken the lead in the horticulture of this State. I know it is invidious to call names, and I do not intend by so doing to shock the modesty of any here present; but if, without offence, I may mention such veterans in the service as Elmer Baldwin, of La Salle; Arthur Bryant, of Princeton; Lewis Ellsworth, of Naperville; J. B. Turner, of Jacksonville; Judge Brown, of Villa Ridge; and the venerable Smiley Shepherd, of Hennepin, men whom to name is to honor, I know you will all feel proud of your calling, and emulous of holding an honorable place in it.

"But perhaps you will say to me, we know that flowers are beautiful and fruits luxurious, but how is it with your own department, entomology? You certainly will not claim that there is any beauty or utility in bugs. Yes, insects, too, have their beautiful, and useful, and even their poetical aspects. Many beetles vie with the most costly gems in the splendor of their coloring; and the butterflies, if not more lovely, are more elaborately beautiful than the lily or the rose. Then, as respects utility, our attention is so frequently and painfully called to the damages done by insects, that we are in danger of losing sight of the benefits which, directly or indirectly, we receive from them.

When we come to look over the whole field of insects, we find that only about one species in two hundred is injurious; or, in other words, out of every two hundred species of insects, one hundred and ninety-nine are either useful or at least harmless. If it were not for insects many plants with deep corollas would fail to become fertilized, and would therefore become extinct for want of the instrumentality of these busy foragers, who in their search for honey carry the fertilizing pollen from flower to flower.

"And the benefits which insects confer upon mankind are in some instances much more direct than this. The bee gives us our richest sweet; and the silkworm furnishes at once the most beautiful and the most durable of fabrics with which virgin youth enhances its charms, and matronly age enshrines its respectability.

"But the most important part which insects fulfill in the economy of nature is that of scavengers. Many extensive families of insects are devoted to this useful office. Some live in the wood or under the bark of decaying trees; some feed upon fungi; some inhabit manure; and others are found exclusively in the carcasses of dead animals. It is the province of these various insects to hasten the decomposition of dead and offensive substances, partly by feeding upon them, and partly by burrowing through them in every direction, and thus exposing them to the action of the elements. Were it not for the performance of this humble but indispensable work, on the part of insects, it is reasonable to believe that the atmosphere would become filled with noxious exhalations, and that the earth itself would become uninhabitable by mankind.

"But the balance which exists in the state of nature between the world of insects and that of plants, we know by sad experience sometimes becomes seriously deranged, and certain species of insects become disastrously numerous; and we also know that it demands all our ingenuity and perseverance to hold them in check."

This remark introduced the practical discussion of the subject.

Here the Doctor entered into the more practical details concerning the habits and transformation of insects. It was in their larval or immature state that they committed their ravages mostly, especially with the *lepidopterous* and *coleopterous* species. Inquiry was made, what effect did the cold winter have on insects? He stated that insects living in the atmosphere, inured to changes of temperature and constitutionally adapted to the seasons, were not easily killed. He spoke of the striped bug, curculio and codling moth, which perhaps have done more injury, or caused the loss, in value, of more fruits than any other insect. He had treated of this insect in his forthcoming annual report, which he supposed would be published soon. The codling moth, he said, was among the hidden, stealthy insects, not attracted by light, shy and seldom seen. The only feasible means of warring against it was by trapping it by bandages around the trees. In large orchards, the expense might be lessened by using coarse, heavy paper. He thought its extermination possible, if communities would act in concert. He spoke of the birds and their offices in lessening the hordes of noxious insects infesting the orchards and farms: they were man's best co-workers, and were it not for their efficient labors, insects would scourge the land.

Here the inquiries from members were numerous.

While Mr. Willis was speaking of the codling moth, Mr. Hoppe entered, interrupting the speaker with an apology that it was not parliamentary, but he wished to invite the company to another room for dinner. Mr. Willis gave way to a motion for recess. All the members now became active working members, responding vigorously to the work before them, the Secretary only remaining, using the pencil. Four vases of

flowers graced the tables; two by Mrs. Hoppe, one by Mrs. Willis, and one by Mrs. A. M. Mitchell, all tastefully arranged by amateur hands.

Apples were on exhibition by Messrs. Hammond and McCune; among the varieties Ben Davis, Wythe and Pryor Red, were the leading ones in point of keeping qualities.

Mr. Hoppe showed wine of 1870, consisting of Norton's Virginia, Catawba and Concord; cider was exhibited by Willis, Hammond and Hoppe. Canned apples of superior quality challenged admiration.

After looking around among Mr. Hoppe's cedars, flowers and fruits, which present a very inviting appearance, the meeting was called to order by the President, who stated that the special subject in the order of programme, was "utilizing fruits." W. N. Grover, essayist, not being present, Mr. Hammond invited Mr. Galusha to give his views on the subject. Mr. Galusha responded, and said the subject was one of great importance to fruit growers and consumers of fruit. The poor quality of much of the dried fruits, on account of the want of better facilities for preparing it for market, as well as the great amount lost and wasted during the season of plenty, caused people to look about for some improvement in drying and preserving fruits, not only for market, but for home use. He alluded to the fruits on the table for dinner, as showing what people could do in providing fruits of superior quality, but said the expense of putting up fruits in that way was beyond the reach of the poor for general use. The people were expecting of those investigating these subjects to invent or discover some more efficient means of utilizing the fruits of the farm. The Alden process had been invented, but was not sufficiently within the reach of the people.

The fruit desiccated by this process is perhaps as near perfection as any inventor can hope to produce; yet the great expense of the buildings and fixtures required to manufacture it, makes the fruit quite costly; and for this reason, he thought this process cannot be profitable to the fruit-grower. The manufactories already started in the State have cost, as the agents inform him, about $25,000 each, though Mr. Schuyler, the general agent, says that the company has a plan for buildings and machinery which will cost but $10,000. He referred to another invention by a Mr. Williams, of Michigan, which produces fruit in every way equal to that made by the Alden process, and, the inventor claims, at a much less expense for fixtures. He had tested the fruit and found it the perfection of desiccated fruit. The necessary building and fixtures for manufacturing by this process, he understood, cost from two to three thousand dollars. He was gratified in being able to state that a new process, based upon entirely new principles, had recently been tested, promising to meet all the requirements in regard to economy, and adapted to the smallest operations, as these dryers could be built for six dollars, or on a scale to cost several hundred dollars. This was known as the Hawley process, invented by B. R. Hawley, of Normal, Ill, and differing from all other modes of drying fruits, in passing the moist air, from evaporation, out at the bottom instead of the top, as by other modes. The quality of the fruit produced could not be excelled by any other process. There was no

scorching, dust or dirt; no discoloration or oxygenation, hence the natural flavor of the fruit is preserved. He thought the time was at hand when it would be difficult to find sale for fruits dried in the open air, exposed to dust, dirt, flies, and the changes of the weather. He explained that the yellow, or rusty color of the ordinary dried fruit of commerce was caused by oxygenation or decay—rotting upon the surface of the pieces of fruit exposed to the air in drying; that if a good, sound apple is stewed with a little piece of a rotten apple, the same flavor would result as that of the common dried apples; but that when fruit is rapidly desiccated in a current of hot air, no such change can take place.

Some one questioned the principle of passing the moist air, from evaporation, out at the bottom.

Dr. Hollowbush said cold or moist air would naturally descend to the bottom, and heated air rise to the top. He thought this Hawley process must be upon the correct principle; as the hot air would be continually passing in contact with the fruit, becoming cool by absorbing moisture, and thus settle and pass out.

Some one inquired if, dried by these processes, fruits were exempt from insects. Dr. Hollowbush said Alden fruits, although divested of their moisture, would, on exposure, absorb moisture and would be equally liable.

The question was asked, when and how do insects gain access to fruit, to cause such general deposits of their larvæ? Dr. Le Baron said he was experimenting with fruits put up in glass jars, boxes, sacks and paper bags, with the view to ascertain more on this interesting question. Some thought the eggs are laid on the outside of sacks and near the crevices of boxes and barrels; that the young larvæ got through as soon as hatched. Others thought the eggs were laid during the process of drying. The more reasonable inference is that the packages partly exposed, and in many instances left open, attract the moth, when the work of propagation begins, and the brief period required for their transformation is sufficient to stock the fruit with thousands of this insignificant little pest. A sack or barrel of dried apples, exposed with the smallest opening, the fruit being taken out as occasion requires, gives the moth the best opportunity to penetrate further into the package.

Mr. Galusha was interrogated as to these rapidly desiccated fruits being sweeter; as to having a portion of the starch converted to sugar by the new process. He said such appeared to be the results. He intended to have a careful analysis made to have this question settled, as there is room for skepticism on this point. It is a fact that it requires less sugar to sweeten any variety of this desiccated fruit than the same variety in a fresh state.

John S. Johnson inquired of Mr. Galusha how long it required to convert cider into vinegar, who answered forty to fifty days. Mr. McCune asked him to state the process. Mr. Galusha entered into the practical details of the process, which are somewhat complicated, and require some knowledge of chemical principles when the operator desires to hasten the fermentation.

Our guests were pretty thoroughly interrogated on leading questions by the members of the Society, and may form the opinion that the Warsaw folks are an inquisitive people. Our apology must be that we are so seldom favored by visits from these dignitaries that when they do come we must make the best of our opportunity.

Mr. Galusha called attention to the American Pomological Society, which meets at Boston the ensuing winter, and desired this Society to furnish specimens of fruits, in connection with the State Society, for exhibition there. Kansas and other States are threatening to carry off the honors in furnishing fine fruits. It is somewhat as our President remarks, that it is only because Illinois has been neglectful, that other States have gained a step in advance. The executive committee appointed G. B. Worthen, E. McCune, Dr. Hollowbush and Dr. Hay a committee to make a collection of fruits to be sent to the Secretary of the State Society for the Boston exhibition.

Mr. Galusha was asked to state his views of the Signal Service. He said he was favorably impressed with the prospect that the Signal Service Bureau would be an aid to agriculture, as it now unquestionably is to commerce. That the time was not distant when the nature and character of storms would be known in advance, so as to provide against them. Before taking his seat would say that he had noticed with pleasure the efforts of our Society to keep up with the progress of horticultural advancement; that in the copies of papers sent him he had noticed our operations for the past year, and that several essays and reports from our Society possessed merits which entitled them to more general notice; and requested that the Secretary of this Society would furnish him reports of its transactions for publication in the next volume of the reports of the State Society.

Orchards were reported prolific in blooming, since which time the fruitage is sparse. Notes handed in by the President, now mislaid, showed the "Wythe apple" among the latest in blooming; a few scattering peach blooms were reported on elevated situations. Small fruits and Richmond cherries doing well. The severe cold has left its mark on peach trees, with here and there affected apple trees.

The President invited the company to test the wines, cider and apples on the tables. Mr. Hoppe's wine of 1870 is "a little risky," a term used on a former occasion, and which threatened to involve the Society in interminable controversy at a subsequent meeting. The Secretary has ransacked the vocabulary of language to find some more fitting expression, but is unable to please everybody in alluding to the excellent products of our vineyards.

The meeting was one of interest; instructive and elevating in moral sentiment, being divested of sectional or political subjects, and devoted to investigations connected with vegetable life.

Time flitted away till the declining sun warned an adjournment.

On motion of Dr. Hollowbush, the thanks of the Society were tendered to Mr. and Mrs. Hoppe, for their generous hospitality.

On motion, the meeting adjourned.

At the meeting in July, raspberry culture was discussed. Mr. Harris stated that on eighteen rods of ground, three hundred and thirty plants were set, which had yielded well, and were uninjured by the extreme cold. This year they had averaged four quarts to the stand, or one thousand three hundred and twenty quarts from the plat of ground, which sold at from seventeen to twenty cents per quart.

Pear culture was also discussed, without eliciting any thing new.

At the special meeting at Hamilton, in August, the cider question was discussed. It was generally conceded that a good article of cider, free from any deleterious ingredients, could be made. It was the impure, adulterated article, which had prejudiced its use.

The question of pure water in its relations to health and dietetic use was discussed. Mr. Ringland read an essay on the subject, presenting the views entertained by the hygienic advocates of pure water. The essay maintains that well and spring water are injurious from the fact that inorganic substances are held in suspension and solution; that these irritating substances are fruitful causes of fevers, and in times of epidemic diseases injurious in irritating the delicate organs and tissues of the body. River water, he considered less objectionable; yet this contained the washings of sloughs, of decayed vegetable and animal matter, offal, etc., which were only partially cleansed out by the currents of the streams.

The following are the concluding portions of this interesting esssay:

"Water is supplied in the purest form in the juices of our fruits and vegetables, and from the clouds. A large portion of our drink should be derived from such fruits and vegetables as compose the natural food of man, and they pursue the wisest course who use abundantly, as regular food, these aqueous substances. There are many examples of human beings living as witnesses of the truth, that these will entirely supply the fluids which the vital economy of the system requires. It is an undisputed fact, that the use of spices, stimulants, salt and fresh meats, make the necessity for far more copious water drinking than a perfectly normal condition of the system would demand. In view of this fact, we must provide a drink, and the only method of obtaining it perfectly pure, is to provide a cistern, well cemented and hardened before using; running through a filter the rain water that falls when the ground is frozen over in the late fall, winter and early spring. This insures that no poisonous gasses will come in contact with the rain, as it falls, and being pure when it descends it will so remain if cautiously watched. In this cistern should be placed a simple chain-pump, to stir the water and keep it pure; while at the top sufficient opening should be left to insure thorough ventilation. To provide a filter is a very inexpensive task—a box filled with sand, gravel and charcoal, answering every purpose. When the spring comes, simply turn aside the spout and you have the most healthful, delicious, cool and refreshing beverage that human beings need, or can truly enjoy. All those who can provide such drink are bound by every consideration of health and morality to do so.

We venture the assertion, that if every family in the land should adopt these recommendations, keep the fluids in perfect harmony with the demands of nature, and the external man correspondingly pure by well-timed ablutions, (say once to twice per week) in this same pure soft water, the decrease in the present aggregate of physicians' bills would be, at the smallest estimate, over fifty per cent. Remember that the price of health is obedience to physical law.

In the discussion which the essay elicited, it was maintained that well and spring water contain the substances of inorganic matter which are essential to the formation of bone and muscle; that nature had so

designed; that the earth was the best filter; that people living in locations of limestone formations were as healthy, and men and women grew to a larger size, and that they were as happy, and lived as long, and in many instances longer, than those confined to pure cistern water. The discussions were of great interest, and awakened many new ideas in relation to water which had not before been discussed.

Utilizing fruits occupied the subsequent meeting, held at the residence of E. J. Hall, in Oakwood.

The October meeting was held at E. McCune's. The balmy air of Indian summer, mingled with the charms of an October sun, the enchanting scenery of variegated colors of purple, scarlet and crimson, the tinging of the forests by the autumnal frosts, all combined to lend additional charms to the landscape.

The company looked through Mr. McCune's extensive orchard till dinner was announced, in which the generous host and hostess manifested their appreciation of the Society in a rural dinner, perfect in all its appointments. The Society was laid under obligations for their generous hospitality.

One peach was laid on the table by John Kemmer, which, with two others grown by him, were all the peaches known here this year. In this connection it may be stated that what few scattering blooms there were this year, were invariably on the highest ground, or most elevated places.

Catawba grapes—very fine specimens—were exhibited by the same gentleman; the vines had been covered.

Modes of keeping apples were discussed at this meeting; barreling seemed to have the preference as the surest mode of keeping; they should be kept from the air and light in an even temperature, and not disturbed; they would not be injured by freezing if kept from air and light till thawed out.

The November meeting was held at the residence of Dr. Hay, on the 3d instant, President Hammond in the chair.

W. N. Grover, chairman of the committee on orchards, made a report, embracing subjects connected with the injury to orchards and fruit trees, resulting from the excessive yield of fruit last year, the severity of the winter, drought, etc. A copy of the report was promised for publication, but has not yet been received, which is regretted as the discussions following were predicated upon it.

Dr. Hollowbush—Were the buds of apple trees injured last winter?

President Hammond—Some varieties were, and some were black in the fruit spur. Buds were exhibited at the April meeting with these conditions. [Several members remembered it.] There was nor sufficient vitality to sustain the fruit.

Grover—A large portion of buds were blasted.

W. N. Grover—After the heavy crop and drought of last year, abundance of fruit buds were formed. Much of the fruit would have fallen prematurely anyhow, if there had been no backsets. Dry weather had a tendency to promote the development of buds—a struggle for reproduction.

Dr. Hollowbush—Any causes which arrest the growth tend to form buds for a succeeding crop. This was particularly instanced with him in scoring cherry trees. The growth was arrested, and the next year an enormous yield of fruit resulted.

W. N. Grover spoke of the presence of fungus on apple trees split last winter; feared injury from that cause.

Dr. Hollowbush—The diseased parts of trees furnish the nidus, or place where the floating spores of fungus find the required element for propagation.

President Hammond said his trees shortened in were in fine condition.

The Society concurred in President Hammond's views, as to shortening in the large limbs and branches of peach trees.

The Committee appointed to visit Mr. Chittenden's orchard made the following report:

Your committee, appointed to visit the orchard of Mr. W. W. Chittenden, to investigate the cause of the death of so large a number of his apple trees, would respectfully report that they have discharged that duty, and herewith present the result of their observations.

Mr. C.'s orchard consists of seven or eight hundred trees of different ages—the oldest planted in 1841. In this old orchard, we found the usual number of dead and dying trees, the result of the heat and drougth of the summer of '72, and the excessive cold of the succeeding winter.

The special object of our visit was a block of trees situated in the northwest corner of his orchard, which were all dead, and had been cleared from the ground. This block consisted of one hundred and fifty or two hundred trees, with a fence running through it from east to west, leaving two or three rows south of it. North of this fence, and about half way to the east line, the ground was cultivated until '69 or '70. Since that time, it has remained uncultivated, and but very little sod has been formed. The remaining portion has not been cultivated for fifteen or twenty years, and is well set in blue grass. That portion that has been cultivated contains about two acres, upon which were planted seventy-two trees—Milams, Rawles' Janets, Red Bellflowers, and Summer Queens. Of these seventy-two trees, only about one-fourth leaved out in the spring, and they succumbed to the heat and drought of summer, while those south and east of the plowed line are as healthy and vigorous as trees of that age can be expected to be.

The question that presents itself to your committee is, What was the cause of the great mortality in this particular locality? It cannot be attributed to tenderness of varieties, for none of the reputed tender varieties were included in the list, and the same varieties south of the fence are uninjured. It cannot be the exposure (which is northwest) as the injured and the uninjured portion is the same. It cannot have been caused by insect depredations, or the line would not have been so sharply drawn. It cannot have been the cold winter, as it was just as cold south of the fence as north of it. Having decided these points, we proceeded to examine the roots, when we discovered that all the surface roots on the south side of the trees were dead, while those on the north side were alive, and apparently in a healthy condition.

The theory of your committee is, that during the severe drought of the summer and fall of '72, the roots on the south side of the trees were killed by the intense heat of the sun, the ground being unprotected by sod, mulch, or shade of the trees, as they had been pruned to an average height of nearly five feet.

The loss of a portion of the roots does not necessarily cause the death of a tree; and in this instance they would probably have recovered if the succeeding winter had been favorable. But as it proved to be one of unprecedented severity, the little remaining vitality was destroyed.

If your committee is correct in their conclusions, the preventive would seem to be heads sufficiently bowed to shade the ground, or if the trees have been so badly pruned

as to render this impracticable, to mulch before the excessive heat of summer sets in.

Our observations in this instance, as well as the experience of the past season, have caused us to somewhat modify our opinion in regard to orchard cultivation, and acknowledge that blue grass in the orchard may not be an unmixed evil, as it is a fact, easily demonstrated, that the soil six inches from the surface, beneath a blue grass sod, is several degrees cooler than at the same depth in a plowed field.

All of which is respectfully submitted.

A. C. HAMMOND.
W. S. HATHAWAY.
C. WILLIS.

President Hammond had near a dozen kinds of apples on the table, which were tested and found all right.

At the December meeting, Mr. Willis stated, in answer to questions, that pear blight, in his opinion, was caused by *frozen sap*. The conditions appeared more prominently in three different forms: first, leaf blight, occurring from June to August; second, when the branches blighted, varying a foot or more from the tops; lastly, that occurring in October and November, when the temperature fell to 10° above zero, catching the upper circulation, and freezing the sap. The theory advanced by Mr. Willis was at the least a plausible one, and may lead to investigations to ascertain more on this hidden subject.

The Secretary sends the following concluding report:

The past year has been one of disaster and discouragement to the fruit grower—the most so of any experienced since orchard fruits have assumed a commercial importance. The causes are mostly due to atmospheric changes. The year 1869 was one of excessive rain-fall; those of 1870 and 1871 of large yields of fruit, and that of 1872 of large yields, attended with excessive drought, taxing the trees to the utmost limit; then followed by the severest winter ever experienced, bursting many trees and overcoming the constitutional vitality, leaving a large proportion of trees weakened, unable ever to recover their original healthy condition. The ensuing year will very likely find a large proportion of trees with weakened vitality. To these, insect depredations will be directed. The results will be—and the sooner the better—the substituting of new orchards.

The storm of the fourth of July was also the cause of much injury to orchards, as well as to the forests. It was the severest storm ever experienced in this locality. Large forest trees and the sturdy elms, sound in their trunks, which had stood the elements for hundreds of years, were broken off, rooted up and prostrated in large numbers. With so many disasters, no wonder some have yielded to discouragement.

At the June meeting, a committee of correspondence was appointed, at the instance of the chief signal officer of the army, and the appointment of the committee was promptly recognized, since which time the committee has been regularly furnished with weekly reports, showing the

areas of storm centers, the amount of rain-fall, rise and fall of the principal rivers; also maps every three months, tracing the storm centers and showing the barometric pressure at all the stations. The committee did not anticipate any thing more than to be made acquainted with the progress made by the signal service, in the hope, however, that sooner or later the practical benefits might be extended to the people generally. When the annual report is received, we may be able to lay before the Society further information on this subject.

Notwithstanding the disasters and discouragements of the year, the the Society has not retrograded, but it is believed to have maintained its standing as fully as at the close of any previous year of its existence.

Many and varied subjects connected with fruits and farm products, have been discussed, and the discussions published, and it is believed they have been read with interest in our locality, as well as having received a share of attention abroad. Among the members on the Society's list is a goodly proportion of men of wealth and intelligence. Its objects are of the most laudable character, in promoting the growth of fruits and farm products, thereby contributing to the health and enjoyment of all.

During the year the membership has been more than doubled; an additional evidence of the Society's usefulness.

The election of officers for 1874 took place at the December meeting, resulting as follows:

President—A. C. Hammond; *Vice-President*—James L. Piggott; *Secretary*—B. Whitaker; *Treasurer*—Dr. Charles Hay.

ADAMS COUNTY HORTICULTURAL SOCIETY.

OFFICERS FOR 1874.—*President*—James Shinn; *Vice-President*—S. B. Turner; *Corresponding Secretary*—T. Butterworth; *Recording Secretary*—J. H. Hargis; *Treasurer*—Thomas Sinnock.

[NOTE.—The minutes and papers of this Society have not been forwarded for publication. It is desirable that papers of such value, as those of this Association doubtless are, should be compiled by the Secretary, and incorporated in our transactions.—ED.]

CHAMPAIGN COUNTY HORTICULTURAL SOCIETY.

OFFICERS FOR THE YEAR, BEGINNING MAY, 1873.—*President*—H. J. Dunlap, Champaign; *Vice-President*—A. M. Fauly, Urbana; *Secretary*—J. G. Thompson, Urbana; *Treasurer*—A. O. Howell, Urbana.

The two following essays are all the papers of this Society that have been handed to the editor; but he hopes another year will bring more, as there undoubtedly has been, and will be, many valuable discussions and papers in their transactions.

FORMATION OF NITROUS ACID IN SOILS AND ITS DISTRIBUTION IN PLANTS.

READ BY A. P. STEWART, BEFORE THE CHAMPAIGN COUNTY HORTICULTURAL SOCIETY, AT THE NOVEMBER MEETING, 1873.

About a year ago there appeared in the Journal of the French Academy of Sciences an article on Agricultural Chemistry, in which the author, Mr. Jeannel seeks to establish the following propositions:

1. That nitrates or nitrites are naturally formed in a soil containing vegetable matter in contact with the air.

2. That it is possible to nourish plants with mineral solutions suitably prepared, so that they will grow much better in pure sand moistened with such solution, than in the best mold without them.

The author informs us that these propositions coincide with the ideas of Boussingault, published in 1856, when, in experimenting on the growth of the Helianthus, he asserted that a plant assimilates its mineral constituents, and has no need of a soil containing decaying organic matter; and that they also confirm the notion of Ville of the agricultural importance of chemical manures. He might have added, that they are a beautiful confirmation also of the views of Liebeg, as expressed in his celebrated theory of mineral manures.

On this occasion we wish to call particular attention to the first of these propositions, viz: the formation of nitrous acid and nitric acid in soils, not because it is new, for the formation of nitre in soils is a fact familiar to every one, but because we behold the fact no longer at a distance. We are brought, so to speak, face to face with the conditions and agents necessary to the fact. The experiments of Jeannel, which have thrown so much light on nitrification, are these: If we take any ordinary vegetable soil in warm weather, and wash it with pure water, the wash water will be found to contain nitrous acid. If the washing be continued until some twelve times as much water by weight as soil has been used, the water that passes through last will contain no nitrous acid. If now, (and here is the important fact,) this soil be nearly dried, and then washed again with pure water, the wash will be found to contain nitrous acid; that is, the simple drying of a soil, in some way produces nitrous acid. Now what ingredients of the soil are the immediate agents in the production of this acid? Is it the decaying organic matter? is it the sand, the clay, the lime, the iron, the magnesia, the moisture? is it one, or all of these constituents combined, that are concerned in the work? To settle this question, Jeannel washed heathy and sandy soils, which did not effervesce with acids, with pure water, allowed them to become nearly dry, and then washed again. The wash water was found to contain no nitrous acid. It is neither the sand, the organic matter, nor the moisture, nor all combined, then, that gave rise to nitrification. He then mixed with the soils some pulverized marble, moistened the masses, and allowed to dry. On washing again, he found distinct indications of nitrous acid. In some way, then, the four constituents, lime, organic matter, sand and water, had given rise to nitrous acid. Such are the experiments of Jeannel, which, so far as we are informed by his paper, were carried no farther, but which, judging from the proposition already announced, left on his mind the impression that vegetable matter, as well as lime, is in some way connected in the formation of this acid.

His experiments suggested the following inferences:

1st. That soils containing organic matter and carbonate of lime do, by the simple process of drying, without the intervention of ammonia, induce the chemical union of the oxygen and nitrogen of the atmosphere, and thus give rise with water to nitrous acid.

2nd. That soils destitute of lime, like those composed wholly of silicious sand, or of peat, do not in drying produce nitrous acid. Such soils are therefore barren, and greatly benefited by liming.

3rd, That in some way the nitrous acid of a soil is intimately connected with vegetable growth; that, therefore, those conditions most favorable to its production are, other things being equal, just the conditions most favorable to growth. Hence we find the season of most luxuriant vegetation is coincident with that of the most abundant formation of nitrous acid. It is when, by alternate showers and sunshine, the soil is constantly passing from the moist to the dry state, that the processes of nitrification and vegetation alike go on most vigorously.

4th, We see how the mechanical condition of a soil is related to growth. To dry rapidly after it has been wet by a shower, a soil must be porous; for when compact, even though supplied with all the solid constituents necessary for growth, it neither receives nor parts with moisture readily, and therefore gives rise to but little nitrous acid.

Such are the inferences of Jeannel.

These experiments have suggested several important questions, which we have endeavored to study, and to which we now beg leave to invite your attention.

1st. What is the true cause of nitrous acid in a soil, or rather is it due to one or to several similar causes? If we wash pure silicious sand with pure water, and nearly dry it, we find by farther washing no nitrous acid. If we mix with such sand some pure pulverized marble, and repeat the process, we obtain nitrous acid. If we now take pure pulverized marble alone, and proceed as before, we obtain again nitrous acid. This teaches us that limestone is one thing, at least, in a soil capable of producing nitrous acid. In some way it has, while drying, the power of changing the chemical combination of the oxygen, nitrogen, and water in the interstices of the limestone to nitrous acid. This acid, under proper conditions, readily passes into nitric acid; and hence is explained the occurrence of nitre in caves of limestone districts—as for instance in the mammoth cave. The walls of the cave are alternately moist and nearly dry, from the intermittent flow of water through the crevices above, and are therefore in just the condition to produce nitrous acid. Hence the accumulation of nitre in caves of limestone, or rather of calcium nitrate, from which common nitre is, in such cases, prepared.

But is limestone the only substance capable of producing nitrous acid? Three other substances have properties very similar to those of lime, viz., baryta, strontia, and magnesia; and the thought was natural, that these substances might also act in a similar manner. Experiment teaches that they do act in a similar manner, although not, perhaps, in every instance quite so energetically. For instance, a mixture of pure sand and barium carbonate, washed until it gave no reaction for nitrous acid, and left three days, gave, on washing again, distinct indications of nitrous acid. A mixture of pure sand and magnesium carbonate, treated in the same way, gave feeble indications of nitrous acid. A mixture of pure sand and strontium carbonate, washed in like manner, gave also feeble indications of nitrous acid. Similar experiments made with fire-clay and sand, also with sesquioxide of iron and sand, seemed to show a trace of nitrous acid; but further experiments are necessary to ascertain the exact truth in these cases. It appears, then, that not only limestone, but several other substances, under similar conditions, have the power of producing nitrous acid. As some of these substances, particularly baryta and strontia, are comparatively rare, their agency in nitrification must be correspondingly small.

It should be added that moderately high temperatures, and free access of air, are indispensible conditions in the formation of nitrous acid. Each of the mixtures above mentioned, when washed clean and allowed to stand twenty-four hours at a temperature near the freezing point, showed no sign of nitrous acid. We learn from this the condition of our soils during the frosty months of the year, and how a cold season, moreover, is ill suited to produce abundant crops.

Another question suggested by the study of this subject is, does calcium sulphate, or gypsum, act in this respect like the carbonate? So far as experiment teaches, gypsum, washed and nearly dried, does produce nitrous acid, although apparently in smaller quantity than that produced by the carbonate. If this be so, it suggests a new theory of the action of gypsum in fertilizing soils, viz., its influence in forming nitrous acid. It will be remembered that one of the most important theories of the action of gypsum in fertilizing soils, is its fixation of the ammonia of the atmosphere and of the soil as sulphate o

ammonia; that this ammonia passes into plants, and furnishes them the nitrogen essential to growth. Not to mention the many and grave objections to this view, based on fact, as well as on theory, it may be said we have in the simple drying of gypsum, mixed or unmixed with soil, a source of nitrogen in the form of nitrous acid, and that, too, without the intervention of ammonia, which will go far in explaining the beneficial effect of this substance on oils.

Those who have studied the assimilation of nitrogen by plants, have generally traced its origin to ammonia, probably because ammonia salts, particularly the carbonate, exert so favorable an influence on vegetable growth. But there seems to be no known reason, why nitrogen may not enter a plant and become assimilated equally well in the form of nitrous or nitric acid, as of ammonia. Indeed, it is well known that nitrates, as, for instance, Chili, and particularly common saltpeter, are excellent fertilizers. These are regarded by Mr. Lawes, of the famous farm at Rothamsted, as among the very best means or increasing the productive power of soils; and this beneficial effect is doubtless due in large measure to the nitrogen in the salt. Now if nitrogen in the form of nitrous, or of nitric acid can enter a plant and become assimilated, and if, moreover, the simple drying of gypsum induces the formation of these acids in soils, it is easy to see at least one relation that gypsum may sustain to plant life. That this is the only agency of gypsum in vegetable growth is by no means asserted; but experiment teaches that this is at least one way in which it may act beneficially.

It may be added, that in so far as gypsum improves a soil by supplying nitrous acid, pulverized marble, or common limestone, would seem to be equally valuable, or better, since experiment teaches that a larger quantity of nitrous acid is formed by the drying of marble, than by the drying of gypsum; and this suggests whether the addition of ground limestone would not be equally beneficial to a soil. In fact, this may be, in part the true explanation of the beneficial effect of marl and chalk, and shell sand, which are applied in large quantities to soils in different parts of England, Scotland, Ireland and France. The benefit has generally been ascribed to the lime furnished to the plants with some organic and other matter usually present in these substances. So far as appears, they have never been regarded as a source of nitrogen to plants.

But if nitrous acid is formed by the simple drying of a soil containing an alkaline carbonate, at a moderate temperature, the natural suspicion would be that this acid would be found in the juices of plants. As soon, therefore, as we had become convinced of the truth of the statements of Jeannel by repeating his experiments, we proceeded to examine plants for nitrous acid. We sought it in the root, in the stem, and in the leaf. We sought it in a large variety of plants, and in the spring during vigorous growth. In many it was found in abundance; in others, only a small quantity, while in others, not a trace could be detected. Generally, it may be said, that just at the top of a plant, where the young leaves are unfolding, and where the stock is in process of elongation, will nitrous acid be found, if found at all. There it was found in the stalk of the potato, although in small quantity. In other plants, like the common garden lettuce, the whole leaf seems to be saturated with it. Here may be mentioned the common garden rhubarb, (*rheum rhaponticum*), the dandelion, (*taraxacum densleonis*), the common plantain, (*plantago major*), shepherd's purse, (*capsella bursa pastoris*), and the May apple (*podophyllum pellatum*). Clover gave feeble signs of nitrous acid, while in general the grasses showed very slight, if any indications of it. Some plants not only gave no permanent indications of nitrous acid, but seemed to contain some reducing agent by which the acid, as soon as present, was immediately destroyed. Possibly in such cases, the acid was in the act of having its nitrogen assimilated by the plant, and, therefore, failed to give any signs of existence. The juice of young stalks of corn, two or three inches high, crushed in a mortar with a little pure water and filtered, not only gave no indications of nitrous acid, but instantly destroyed the indications of some that was added. Some substance of a reducing nature, therefore, is evidently present in the corn, which not only destroys the nitrous acid that may enter through the roots, but destroys that even which is added. The same is true also of the roots of corn, and also of the young stalks and roots of wheat and rye; and the same is probably true of oats and barley, although experiments have not been made with them, except with barley that

had been sprouted for preparing malt. In this case the kernels had become dry and no nitrous acid was found.

The chief interest of this investigation is its bearing on the source of nitrogen in plants. It is well known, as already intimated, that some, like Liebeg and Boussingault, trace it to the ammonia that enters the plant through its roots, while others, like Ville, contend that it is absorbed by the leaves directly from the atmosphere. A potato had been lying several weeks on a table in the laboratory until green sprouts, half an inch or more long, had appeared. It occurred to Mr. Gennadius, a student greatly interested in the subject, that if nitrous acid could be found in the sprouts, it would be conclusive proof that it came not from the soil, but from the atmosphere. On examination, strange to say, the sprouts were found thoroughly charged with nitrous acid. At first it was suspected that the sprouts had absorbed the acid from the atmosphere of the laboratory, to the fumes of which they had been so long exposed; but on examining sprouts not thus exposed they were found equally charged with nitrous acid. Then it was suspected that possibly the chlorophyl, under the influence of light, had been concerned in its formation; but perfectly white sprouts from any dark cellar give equally prompt and decisive indications of its presence, and it is not a little singular that in the potato, in whose stalk and leaves, if we except the tops, little, if any, nitrous acid can be found, should have such an abundance in its sprouts. But this is not all. It will be found by carefully examining the potato, that not only the sprouts but the eyes and the entire epidermis contains nitrous acid, and that beneath the skin, in the interior of the tuber, not a trace of it can be found; and if it be examined, as it has been at different periods of its growth, from the time it is of the size of a pea to the full grown tuber, the same will be found true.

In like manner, nitrous acid is found in the skin of the sweet potato, and in the tuber of the dahlia, while in the interior, at a depth not above the thickness of ordinary pasteboard, not a trace of it can be found. We have no doubt the same is true of the Jerusalem artichoke and the ground nut, although we have not yet been able to obtain specimens for examination. In the bulbs of the tulip and the hyacinth no nitrous acid could be detected either in the skin or in the interior. In the root of the African lily, only a trace was found in the skin, none in the interior, and none was found in the root of the peony. It is an interesting fact that in the beet, a plant well known to contain an abundance of nitre, no nitrous acid has yet with certainty been found. Also the turnip and the carrot, so far as we have been able to learn, are likewise destitute of it. It is possible in the case of the beet that the nitrogen enters the plant in the form of nitric acid; or it may enter as nitrous acid and the condition of the plant be such as to immediately transform it into nitric acid, although the change of nitrous to nitric acid in a plant is far less probable than that of nitric to nitrous acid.

Now whence comes this acid, and what purpose does it serve in vegetable economy? Does it come from the soil, which, we know, contains it, and which envelopes the roots and tubers during the growth, or is it like starch, elaborated in the leaves, from which it passes through the stalk into the tuber, or does it come in part from both sources, or, finally, does it enter the plant as a nitrate and become reduced to a nitrite by the organic matter of the plant, as nitre for example, is reduced to the corresponding nitrite by passing through decaying vegetable matter like humus? So far as one can judge from known facts, the probability seems to be that it passes from the soil into the plant, and, like potash, performs an important function in vegetable growth. The fact that little if any nitrous acid is found in the mature leaf of the potato, and but little in the stalk, while an abundance is found in the tuber, points to this conclusion. Then the fact that nitrates added to soils produce luxuriant growth cannot well be explained in any other way.

But few experiments have yet been made with fruits. In the apple, however, the acid is readily detected, particularly in sour apples; and the general fact is that it is most abundant in the interior, particularly in the core, differing in this respect from the potato. Several varieties which have been examined—the Bellflower, Rambo, Smith's Cider and the Fallawater, a large green apple, said to be from Northern Indiana—have all given indications of nitrous acid. It was only in the core, however, that it was found

in the Rambo. In the common green crab-apple it was found all the way through. In the seeds of the apple none has been found.

Before concluding it is proper to say that the test used in the above experiments was that originally employed by Schoenbein, and afterward by Jeannel, viz: starch, potassium iodide and sulphuric acid. As iodine is often set free when sulphuric acid acts on potassium iodide, we have latterly, to avoid error, substituted phosphoric for sulphuric acid. Moreover, as starch, when boiled, undergoes a change by long standing, whereby it produces a blue coloration with iodide of potassium and sulphuric acid, we have been careful to use freshly prepared solutions of starch, and to compare the action of the reagents on each other with their action on the juices tested.

In conclusion we may say the subject is comparatively new. So far as we know, only one paper has ever been published on the distribution of nitrous acid in plants, and of this we were unfortunately ignorant, until a large part of the work detailed in this paper had been performed. It is yet too early to see clearly the bearing of the facts on vegetable physiology and to draw general conclusions. The subject will be further studied, and such results as shall be obtained will, in due time, be given to the public.

OUR HOMES.

AN ESSAY READ BEFORE THE CHAMPAIGN COUNTY HORTICULTURAL SOCIETY.

BY MRS. A. L. FARR.

The subject assigned me by your Society, "Our Homes," is a subject of so wide a range, and so varied in the thoughts connected with it, that the difficulty I find in treating it is, what to say, and what to leave unsaid. The house, its indwellers, its furnishings and surroundings, constitute that charmed place which we call home—the dearest place on earth—the sacred shrine of all our earthly joys and sorrows—the very center of human happiness. Home is the house, the yard, the garden, the farm; yet a person may possess all these, and not have a home in its truest sense. It is necessary to have the life expression of intelligence, and heart, too, which is the soul power of a true and loving home, in order to have it complete in its perfectness. The several parts of a so-called home may be perfect in themselves, and yet if, when combined, they possess no soul power, or speaking intelligence, it is no home. The several parts of a locomotive may be piled up in the shop, but it is not properly a locomotive until its parts are adjusted set in order, and the living soul—steam—is breathed into it, and it becomes a living thing.

God gives us the material of this world with which to make our homes. He gives it to us in the rough, and we have it in our power to arrange, to set in order, to beautify, so that it shall give expression to our tastes, to our ideas, and to meet our wants. A house, a yard, and a garden are very expressive of the character of their owners. If I pass a tidy, although unpretending looking house, and see a neatly trimmed lawn, ornamented by a few choice flowers, a hanging basket, or a vine creeping over the door, I can judge very well what kind of people live there; or, if I pass a house, and see no vestige of a tree, plant, or shrub, with corn and potatoes planted in the front yard, and weeds growing in the garden, I can also judge what kind of people live there.

The house is designed for two things—use and beauty. It is for our comfort, and should be so constructed as to combine the useful and the beautiful, and it should be adapted to the wants of its occupants, both for convenience and gratification of the eye. To possess both of these qualities, it need not be a costly house. A palace is not always a home, but a "little brown cottage" may be the very ideal of one. A house is for the family; and if we are able to have a large and costly one, and have the taste and skill to properly adorn it, so much the better; but most of us are not of the wealthy, and are not able to gratify our tastes for costly, luxurious, and elegant adornments for our homes. The practical thing with us is, how to make a cheerful, attractive, beautiful home in our moderate circumstances. A good maxim in the house, as well as in every thing else, is, to "make the best of what we have." Many houses are built at great expense, by persons not having taste and skill to beautify, which are only monuments of cold money

they look cold and lifeless; their exteriors look bleak, and their interiors make one feel homesick. It is singular, and painful sometimes, to observe the manner in which some people build their houses—square and angular. Like themselves, they have a sort of set-down methodical, awkward look, as if the least departure from the ordinary old-fashioned method of house building, would be a sin. To them, a bay-window, or a dormer-window or even an arched window, or a verandah ornamented with a little filigree work, is a very useless expenditure of money. In-doors, the furniture has the same prim, stiff look; the hard chairs are placed squarely against the wall; not a picture or book can be seen. In fact, so vacant and homesick does every thing appear, both in-doors and out, that one feels loth to ever enter the house again.

Perhaps I may be weak on this point; but if there is any thing I desire money specially for, it is to gratify my taste for pretty things for the house. I would not care for costly furniture for the parlor, but plenty of luxurious easy-chairs and lounges, instead of these hard, stiff parlor suits, which are so fashionable, and which make you feel so awkward when you sit down. I would have a few choice pictures and books, besides numberless little valuables and conveniences, which tend to make the parlor and sitting room charming and homelike; a carefully trained English ivy, over a choice oil painting or chromo; a window full of thrifty plants, with God's beautiful sunlight gilding their fresh, green leaves and gay flowers; a hanging basket; an aquarium; and a few mosses and ferns from the woods, to gladden the eye. All these, to my mind, can beautify our homes, and furnish them far more exquisitely, than simply elegant velvet carpets, stiff sofas, cold marble-top tables, and five hundred dollar pier glasses, in a dark and unused parlor. The dining-room and kitchen need not be devoid of taste and beauty; for here it is that we housekeepers spend most of our time, and we need things comfortable and convenient. The dining-room table, and what is put upon it to eat, speak plainly of the habits and tastes of those who sit about it. It is said that "coarse food makes coarse people;" and if this is true, we should banish coarse graham gems, made after the water-cure system (not the light, delicious ones, made with yeast) from our breakfast tables. There is a good deal of expression and home-like look in a well set table—not so much in the great variety and quantity of food upon it, as the artistic arrangement of that which we do have. I advocate the every day use of the silver we may possess, and not have it stored away, to use only when we have company. The cake-basket and napkin rings give an air of refinement, and a pleasing look to the table, and have a refining effect on the children; and, with a spotless white cloth, and napkins, and a vase of flowers, will often make a simple meal very relishable. Let our tables, then, be atttractive—not in the luxurious appointments which wealth can give, for that we do not possess, but in the cordial welcome we give the stranger who may chance to dine with us, and gladden the hearts of our friends who visit us.

There can be much taste displayed in the kitchen, without leaving out the idea of beauty. A picture is not out of place, even here; and I would choose an engraving of "Shake Hands," taken from an oil painting, and representing an Irish girl, just taking her hands from the dough, and laughingly offering to "shake hands" with you. I think I would hang it over my kitchen table, that, when vexed with pies and puddings, I could look up and meet the responsive, sympathetic laugh of Bridget. If unable to have pictures, rows of bright tinware, which any one can have, would do well for adornment. The kitchen needs to be ample and convenient, and the stove and pantry so located as to save time and labor.

The sleeping-rooms should be large and well ventilated, and so attractive in their surroundings as to invite to rest your tired body at once. To do this, it is not necessary to have a costly suit of rosewood or mahogany. I have been in a friend's guest chamber, which looked so comfortable and cheerful that I forgot to notice the absence of rich and elegant furniture. The wash-stand and toilet-table proved to be home-made; but so deftly and tastefully were they concealed by muslin and lace, and many other tasteful conveniences, that they were quite charming in appearance. A well made bed with generous looking pillows and a snowy counterpane, is the very essence of comfort. In fact, a little taste and ingenuity will make almost any house both home-like and comfortable.

In a thousand little ways, and with the rare art of knowing how to make a little money do a great service, the housewife can make her home attractive to her family and friends. Some will say that they have no taste or ingenuity in that way; but you can say to them, *try* at any rate; although, when you see the result of their attempt, you might feel sorry that you gave the advice. It is idle for people who live in rented houses, although inconvenient and badly constructed, perhaps, to say that it does not pay to spend time and labor to make them look home-like. The old adage comes in here aptly: "Put the best side out." A very little expended for paper and paint, and may be other conveniences, will often "pay" over and over again in comfort and health. There is no excuse for allowing the yard and garden to grow to tall grass and weeds, or the fences to become broken, because it is rented property. If there can be no choice shrubbery grown in the front yard, a bed of verbenas, pansies and asters, can be cultivated, with little expenditure of strength and time, while they will be a source of beauty and pleasure all summer. God made annuals on purpose for people who live in rented houses; and I consider it a sort of disgrace for people to disregard these God-given beauties, when they can be had so cheaply—almost for the asking. Let me say here, that I believe that many, very many more than do, could possess homes of their own, instead of paying out yearly large sums of rent for houses, both poorly built and uncomfortable. If people would be content to live even in small houses, in a modest way, and call them their own, and expend that which they would pay out for rent, in improving and enlarging them, I think it would give them far more happiness and comfort; and, in a financial point of view, they would be the gainers also. Besides this, there is a great pleasure in seeing things grow and prosper which belong to you. How much satisfaction it gives to watch the growth of a choice shrub or evergreen, a fruit tree or grapevine, we who possess homes know. There may be a selfish element in the idea, but there is luxury in possession, which I believe to be not only entirely excusable in us, but also praiseworthy.

The farmer, with all the hurry and bustle of farm work, should find time to improve and beautify his home. It is no excuse to say that he has no time. Trees and hedges should be planted, and kept closely trimmed; for, in this prairie country of ours, what is more beautiful? God has been so lavish in his expenditure of materials, which he gives us, with which we can adorn and beautify our homes, that I consider it a sin not to employ them to our own best advantage. The effect is to refine, ennoble and purify. Who can estimate the power of a beautiful Christian home, adorned with the princely treasures of God's own handiwork, upon ourselves, our children and our friends? Is there an erring one in the family? What can be more effectual in restoring the lost one, than the influence of a beautiful home, where dwell cheerful faces and loving hearts? God never made an ugly thing; and he never made us to look ugly, either in our persons or characters. He bids us to use all the means in our power to make ourselves look as well as we can; and if it can be done by a few ruffles and feathers, ribbons and flowers, and jewelry, too, if we can get it, it is all right, if they are all in accordance with esthetic rules. The old puritanical, ascetic idea of mortified pride in such things is done away, and is of the past, thank heaven!

We have in our power, then, to make our homes just as we choose. Shall they not be made in such a way, with cheerful, loving hearts as the soul power, and christian principles as the ground-work of all? Thus shall they tend to refine our characters, ennoble our lives, elevate our affections, and fit us for a far more beautiful "home not made with hands."

JACKSONVILLE HORTICULTURAL SOCIETY.

OFFICERS FOR THE YEAR COMMENCING JUNE, 1873—*President*, Hon. Edward Scott; *Vice-President*—B. H. Chapman; *Cor. Secretary and Librarian*—Dr. H. W. Milligan; *Recording Secretary*—A. L. Hay; *Treasurer*—Mrs. Deweese.

Standing committees are appointed upon the following subjects: Small Fruits, Culinary Vegetables, Vineyards, Orchard Fruits, Preserved Fruits, Horticultural Philosophy and Practice, Fine Arts, Entomology and Ornithology, Botany, Shade Trees, Floriculture, Green-house Plants.

One of these committees reports each week, and in the order named, beginning June, 1873.

Meetings are held in the Court-house, in Jacksonville, the first Saturday evening in each month.

The record of the last annual meeting is the only paper sent to the editor for publication, which is as follows:

JACKSONVILLE HORTICULTURAL SOCIETY—JUNE MEETING.

The annual meeting of this Society was held at the Court-house on the evening of the 7th inst.

The reports of committees being the first thing in order, Mr. Hart H. Massey, from the Committee on Orchards, entertained the Society with a few interesting facts gleaned from his more than half a century of varied experience in fruit culture in the West. In 1818, he settled in Illinois, and for want of something better, he experimented with the persimmon, and shortly learned that its use, especially in the green state, could not be highly recommended. He afterwards crossed the country to Missouri, where, among the wild fruits which attracted his attention, he found a strawberry of uncommonly strong growth, and enormously productive, the flavor of which was far superior to that of any variety we have in cultivation to-day. But being naturally attracted by the pomonal names of several streams running through Iowa, he traveled in that direction, and after wandering the entire length of Plum Creek and Apple River without finding even a tree or shrub to remind him of the name of either, he concluded that there was nothing significant in the cognomen attached to the perishable things of this world, and returned to Illinois, where he has since lived. He secured his first respectable fruit from seedlings, one of the original trees of which is yet standing on his farm. It is over fifty years of age, and fruits annually, yielding a fair crop of remarkably good looking apples, which, without any extra care, may be kept until the August following.

He received his first grafted fruit from Ellwanger & Barry, of Rochester, New York. Having no experience of his own or other western men to guide him in his operations, he followed the instructions given by eastern planters, dug holes four feet in diameter, and three feet deep, and cut trees back to within two feet of the ground. In a few years, he found that his low-headed trees were a nuisance, and commenced trimming, and had been at it ever since. He had now learned from his own experience that four and a half to five feet was the proper distance from the ground to start a tree-head.

Trees leaning to the north or northwest are liable to sun-scald, which may be prevented by nailing a board over the exposed parts. Where nails were driven for that purpose, many years ago, the trees were still alive and thrifty, while those not so treated, have long since "gone where the woodbine twineth."

Mr. Massey has at present growing upon his farm thirty-three popular varieties, and about a dozen other varieties of grafted fruit he did not name, besides quite a number of valuable seedlings.

For planting in this district he would recommend Early Harvest, Red June, Golden Pippin, Orange Apple, Little Romanite, White Winter Pearmain, New York Pippin, (though the tree is not healthy with him), Yellow Bellflower, Newtown Pippin, Fallawater, Norton's Melon, Rawles' Janet, Fall Wine, Domine and Pomme Grise. The latter variety is a heavy annual cropper—fruit small, deeply russet, flavor excellent, and will keep just as long as he can keep the boys away from them—at least to June or July. He thought that the Janet might be superseded by better varieties. The Newtown Pippin fruited well but scabbed badly. When free from scab it kept well, and was excellent for family use. Fall Wine he highly recommended for family use. White Winter Pearmain fruits annually and keeps until July.

President Turner entertained the Society with a paper on street-shading. He pronounced the Elm the best adapted to street-shading. The Soft Maple is too easily broken by wind, and subject to borers. The Rock Maple, with its huge autumnal and purple boquet, is the most magnificent of trees. He spoke highly of the Tulip tree, but it could not stand a drought any better than a temperance man. The Chestnut, though an excellent shade tree, was like all other nut-bearing trees, tap-rooted and not easily transplanted; the White Pine is a favorite with him; the Red Cedar behaved so badly he feared it would have to be abandoned; the Hemlock stands unrivalled for hedges and screens; the Austrian Pine and Norway Spruce, he classed among the most beautiful evergreens; the Tyrolese Larch was much neglected; if once introduced it would be largely planted.

Small trees and fall delivery he considered a humbug, but a good thing for the nursery-man, as the planter is generally obliged to duplicate his order.

Mr. Massey would recommend the Coffee tree for shade; it has no insect foes, stock will not touch it—is perfectly hardy, a rapid grower, and easily transplanted.

It being the annual meeting, the Society proceeded to the election of officers for the ensuing year. Professor J. B. Turner, who for three years past has faithfnlly served the Society as President, emphatically declined a re-nomination. [See list above.—Ed.]

ALTON HORTICULTURAL SOCIETY.

At the annual meeting of this Society, held January, 1874, the following officers and standing committees were chosen:

OFFICERS—*President*—H. G. McPike, Alton; *Vice-Presidents*—D. Williams, E. A. Riehl, Alton; *Secretary*—O. L. Barler, Upper Alton; *Treasurer*—D. Williams, Alton.

STANDING COMMITTEES—On Orchards, Jona. Huggins, Ornamental Planting, H. J. Hyde, on Vegetables, E. Hollister, on Vineyards, E. A. Riehl, on Small Fruits, Captain Stewart, on Flowers, Mrs. E. S. Hull, on Entomology, Maj. J. R. Muhlemann, on Wines, Dr. E. S. Hull, on Ornithology, Dr. B. F. Long, on Orchard Fruits, F. Starr.

COMMITTEE OF PLACES OF MEETING.—Mrs. E. S. Hull, Mrs. J. M. Pearson, Mrs. E. Hollister, Mrs. H. J. Hyde, Mrs. Capt. Stewart.

At this meeting, the work of the year was vigorously entered upon, and while recounting the disasters of the past, all seemed determined and hopeful for the future.

The report of Standing Committees being called for, Jonathan Huggins read a report upon Orchards, which he forgot to leave behind him. The essayist predicted "a good time coming" for the careful and industrious fruit grower, which remark awakened a lively discussion.

DISCUSSION ON THE REPORT.

Dr. Long—*Mr. President*: I think there are, in this report, some statements that will bear questioning. Certainly there are two sides to this question. Sirs, I would like to know what there is in the earth or air, or atmosphere of the times to encourage the fruit-grower to extend his operations? Where is the profit in an apple orchard, when you cannot sell your apples for the cost of production? I think a wise policy in this matter would dictate curtailment and not extension. To be sure, every farm should have its orchard, to supply at least the home demand. But at this time, and with all the facts before us, to encourage extensive planting of orchard fruits is not good, in my opinion. Better grow wheat and corn and other grains, which are the great staple products of the country.

We are told that there has been a great destruction of fruit trees throughout the country, and hence we may expect better prices. But there are multitudes of young orchards that are just coming into bearing so that there will be no lack of fruit in the market, and, in my opinion, we cannot hope for any material change for the better. I think we have unintentionally done harm to the country by exaggerating the profits of fruit culture.

I do not question that a thoroughly practical and scientific orchardist may grow fruit with profit. But that farmers generally, in the slipshod manner in which it is done, can profitably grow fruit, I do not believe. At any rate, it is well to look at both sides of this question.

D. Williams—I can sympathize with Dr. Long in his views of this question, and I affirm here to-day, that there is almost no sale for the apples grown in this region. They are very poor in quality this year—so poor, sir, that if they were given to me, I could not ship them to Chicago with any hope of getting as much as the cost of transportation and cooperage. From some cause, our apples are very inferior to those of Michigan and Western New York. Why, sir, I was in Chicago the other day, and saw our apples side by side with those from Ind., Mich., and N. Y., and I was surprised at the contrast. Our apples would not sell with them. It was like asking a man to give you a dollar for a dime. If this is to be the quality of our fruit in the future, I can see no possible profit in extending our orchards. I have plenty of apples, and want to sell them, but it is useless to ship them to Chicago, for they will not pay expenses. The St. Louis market is little if any better.

Mr. Miller testified to the inferioriiy of our apples, as compared with those from other sections, as he saw them in the Chicago market, the past summer. Good apples were in demand, but poor apples were dull at any price.

Dr. Hull, while admitting the failure which almost inevitably attends the slip-shod culture system of the majority of orchardists, yet took a hopeful view of the subject as it regards the careful cultivator. "It will pay to grow fruit, if you will grow it well. There is no better fruit region in the world (with few exceptions), for such fruits as we do grow, than right here. The Michigan fruit-growers are now in the condition as to their orchards, which we once were when our fruit was fair, and they will soon be in the condition in which we now are, unless they are more careful than we have been." He thought, however, we should yet retrieve our former good name, and grow fruit equal to that of any other district. This by "eternal vigilance," and not otherwise. The Doctor was careful not to give a crumb of comfort to shoddy cultivators.

Mr. Huggins explained that his position was scarcely in conflict with the views expressed. He was, in his case, hopeful of satisfactory returns, because he meant to give his orchard the attention which it demanded. He was wide awake to the importance of careful culture, and proper treatment of the orchard, and did not think a different course would be successful. The discussion was continued for an hour, participated in by Hyde, Hollister and others.

Drs. Hull and Long questioned the theory advanced at Champaign, that the *drought* had something to do with killing the fruit trees last winter.

Captain Hollister's observations were that trees standing in hard ground without cultivation were injured, and sometimes killed, while trees cultivated suffered no harm.

Captain Hollister gave a brief verbal report on this subject. He said now was the time to sow your lettuce, cabbage and raddish in hot beds. To succeed here, plants must be started early; cauliflowers should have been started even before this. He used the hot air flues and would use no other. He had tried them for two years, and liked them. All plants should be transplanted, in hot bed, to make them stocky and firm. The Wakefield, Wyman and Oxheart, are the varieties of cabbage most in favor among us.

Mr. Huggins made a verbal report upon the condition of the Secretary's book, and the need of stationery for the use of the Society.

The Society voted that the incoming Secretary should make the necessary purchases of stationery, and draw on the Treasurer for the amount.

Captain Hollister reported the balance in the Treasury, $71.23, whereupon a great burden was rolled upon the Society to know what to do with so much money! Some wanted to offer premiums for excellence in this direction or that. Some thought the Secretary deserved pay for his services. Some thought one thing, and some another. All were seemingly anxious to get rid of the money. The final conclusion was to let the funds remain untouched, as an inducement to increase the membership. When men come to understand that we are not bankrupt, but have money in the treasury, they will treat us with great consideration, and many will be happy to join our number.

E. A. Riehl presented four of five bottles of wine, including Concord and Virginia Seedling, which was pronounced to be standard in all respects.

The President, O. L. Barler, about to make his bow and step out of office, conformed to the custom and read the following:

THE GOSPEL OF HORTICULTURE.

"Josh Billings divides the human race into three classes: 'Those who think it *is so*; those who think it is *not so*; and those who don't care whether it *is so or not*.'

"Now, there are among us three classes of persons: Those who think horticulture is a failure; those who think it is not a failure; and those who do not care *much* whether it is a failure or not.

"You will class me, if you please, among those who think it *is not so*. And I now propose to discourse briefly concerning the *Gospel of Horticulture*, for I believe there are good words and promises recorded for the encouragement and cheer of all who are legitimately and intelligently engaged in horticultural and agricultural labors.

"That the majority of those who affect to till the soil make wretched failures, I must allow. That nine out ten who start in horticultural and agricultural pursuits have greatly inflated and exaggerated hopes, which, of course, are never realized, I do believe, and I hear the moan of the disappointed and oppressed ones all about me. How sad and disheartening is the story of many a would-be successful farmer. One of them, in writing to the *Country Gentleman*, recently, gives in his experience thus: 'I have five hundred acres of land; I keep fourteen horses; don't have much grass; keep twenty head of cattle, and hire seven hands on the farm. I buy hay; I buy corn; I buy mill feed; I buy straw. I am clean out of fodder. I milk eight cows; I don't get much milk; my cows are poor. I buy fertilizers; I buy seed oats; I buy vegetables; I buy meat. In fact, I buy nearly every thing I use. I pay taxes on my farm and I pay taxes on my stock. I cultivate a large surface of land, and I don't sell any thing except about enough

wheat to pay for the guano! What must I do? What is the remedy? I am worth about $15,000 besides the farm. How long will it take to break me?'

"The editor of said paper justly remarks, in effect, that the answer to the question, 'How long will it take to break me?' is the simplest problem in figures. If the expenses in taking care of the horses, cattle, laborers, and in providing all the supplies, for three hundred and sixty-five days, amount to $15,000 over and above the proceeds of the farm, one year will suffice to break him. If, however, the expenses exceed the income by only $5,000, it will take full three years to effectually use up this farmer.

"And would you believe it, there are some men who do not seem to know that if they pay out more than they take in that they are doomed to financial ruin, at the last. It would be an act of astutest wisdom if, when a man finds that he has no qualifications, and no ability to make horticulture and agriculture pay, he would get out of it; the the sooner he quits the business the better for him. Fortune awaits him in other directions, no doubt. Let him find his place in the world; there is a place for him somewhere, and by and by he will slide into it by the very gravitation of his nature, and 'swing there as easy as a star.'

"Nothing is more evident than this: Some men, in their relation to horticulture, are failures, but horticulture is no failure. If horticulture should fail, the world would fail, and the sun of every enterprise would set in night.

"Sirs, I have the utmost confidence in horticultural and agricultural pursuits for myself; I speak for no other. Nothing has happened to awaken within me the faintest regret, that I am what I am. Is is not uncommon to find men in every profession and calling, *depreciating* their condition and work. The shoemaker thinks any calling better than his own. The school teacher would be almost any thing but what he is. The mercantile man thinks he has more worying care and frightful dreams than fall to the common lot of mortals, and he sighs for a quiet home in the rural districts. And so it goes, the world over. But you mistake, if you class *me* in this category. I have not a whit less enthusiasm in my work to-day,

"'Than when I first begun.'

"I may never be *wealthy*, yet I expect a competence. And with no aspirations for power or place, I am happier than a king.

"To tell the whole truth; hard as I have been compelled to labor, and severely tried as I have sometimes been, I would not, to-day, wish to exchange my hopes and prospects for this world, nor—for that matter, I speak reverently—for the world to come, for those of any other man.

"What I mean to say is. I am quite contented *in*, and proud *of*, my calling. 'I would rather,' said President Wilder, in his address before the Massachusetts Horticultural Society, 'be the man, who shall originate a luscious fruit, suited to cultivation throughout the land, of which successive generations shall partake, long after I shall be consigned to the bosom of mother earth, than to wear the crown of the proudest conqueror who has triumphed over his fellow men.'

"There are a great many men in the world who are seeking and expecting to make a living *without work*. They try this profession, and then that, this calling, and then that. then even try—deluded souls—*horticulture*. They were led in this direction under the specious argument that crops grow while men sleep.

"Horace Greeley never said a truer thing than this: 'The darkest day in any man's earthly career is that wherein he fancies there is some easier way of gaining a dollar than by squarely earning it.'

"Now, if any man gets his living by horticulture, it may be supposed that it is done upon the square. There can be no sophistry here. Mother earth will not even be coaxed, teased or trifled with. Give her what are her dues; feed the soil; cultivate thoroughly, and give your whole intelligence and energies to the growing crops, and you will get sufficient reward.

"But the simple may ask, 'Do you know all about horticulture?' That reminds me of a story. Capt. Jack, just before his execution, asked the chaplain, who was trying to give him spiritual consolation, if he knew all about God and the happy land. The chaplain thought he did. 'Then,' said the Modoc, 'you know all about him, me give you

ten horses to take my place to-morrow!' The good man didn't know about that. We know very little about horticulture. We are learning something every day, and one object of these meetings is to learn from one another, and though our gatherings are not always large, we have some zealous students, who are ever in the wake in these matters, whom I am confident will devise liberal things for the year to come.

"We cannot ignore the fact that our effective force has been greatly weakened by the necessary withdrawal of such sturdy horticultural workers as the honorable gentlemen, W. C. Flagg, J. M. Pearson, James E. Starr, and Wm. E. Smith, by a diversion of labors, and by the incidental absence of such tried servants as E. A. Riehl, Solomon Johnson, and some others. * *

"The experience of the past year would not seem to justify the attempt to introduce other than subjects intimately connected with horticultural and agricultural matters. There is, doubtless, enough work to occupy the day in hearing the ordinary reports and discussions presented by the committees.

"But suggestions are in order. One thing is certainly desirable to give character and permanency to our organization, and that is, to complete our programme early in the year."

The next business in order was the election of officers, which resulted as follows. [See list above.—Ed.]

On motion of Capt. Hollister, the President and Secretary were appointed a committee on programme, to arrange the business for the year, and print the cards at as early a date as possible.

The only new feature in our programme for the coming year is the appointment of twelve essayists, one for each month in the year, whose duty it shall be to introduce some appropriate topic of his own choosing for the edification of the Society.

Society adjourned.

JONA. HUGGINS, Sec'y.

ONARGA HORTICULTURAL SOCIETY.

REPORTED BY W. H. SPURGEON, CORRESPONDING SECRETARY.

Officers for 1874.—*President*—J. B. Clark; *Vice President*—E. D. Robbins; *Recording Secretary*—J. L. Burnside; *Corresponding Secretary*—W. H. Spurgeon; *Treasurer*—H. Pinney; *Librarian*—Lyman Pike. Present number of members, fifty. The Society holds weekly meetings.

At the meeting of January 4th, 1873, the address of Com. Maury, at St. Louis, was discussed, in connection with the advantages of an application of meteorological science to agriculture and horticulture.

At the meeting of January 11th, Mr. Congdon made a few practical remarks in favor of planting and growing evergreens, not only for ornament and shelter, but for profit in lumber and timber.

Messrs. Pike and Ellis spoke in favor of evergreens as protection for stock in winter, and of the great necessity of replacing, or making good the supply of timber, which is so rapidly being exhausted in the destruction of our forests, by planting largely and annually of valuable species.

JANUARY 25.—The subject of canning fruit was discussed, and nearly all members present spoke in favor of taking measures to procure a canning establishment in our midst, so that the fruit-growers of Onarga and vicinity might be able to utilize all their fruits. A committee was appointed to obtain information relating to the enterprise and report at the next meeting.

At the meeting of February 1st, the committee on fruit canning reported favorably to the establishment of a canning factory, and was continued.

At the meeting of February 8th, the subject of pruning apple trees was discussed at length; the prevailing opinion was in favor of pruning in February, and painting the stumps of branches cut off, so as to prevent decay and facilitate the healing of the wound.

In a discussion upon varieties of cherries, at this meeting, the Early Richmond, English Morello and Black Tartarian, were highly commended by the speakers, as adapted to this locality.

At the meeting held March 1st, the committee on canning reported further, giving much valuable information. Apple tree blight was also discussed at this meeting, resulting, as usual, in doubt as to the cause. One member had discovered small larvæ in the pith of branches of apple trees, and suspected that they would produce blight.

MARCH 8th.—Floriculture was the topic for the evening. Mrs. Congdon read an essay showing that with little expense and time home and its surroundings could be made attractive and pleasant, and urging parents to so adorn their homes as to make them the most desirable places for their children—such homes as in after years they would look back upon with fond recollections.

One member spoke disparagingly of the use of a certain vegetable, called tobacco, and thought that if the money squandered in its use were devoted to the purchase of plants and seeds, and the cultivation of flower gardens, it would be a great advance in horticulture.

At the meeting held on the evening of March 15th, the committee on canning reported further, and the propriety of connecting a drying establishment with one for canning was discussed, and the plan met with general favor. Communications from parties owning patents for dryers were read, and the Alden process was pretty severely criticized on account of its expensiveness, and the plan of operating it being unfair to the fruit-growers. Some other drying processes and fixtures, which were described, were considered far preferable to this. At this meeting seeds and cions from the Agricultural Department, at Washington, were distributed.

At the meeting of March 22d, steps were taken to form a stock company for canning and drying fruits. A committee was also appointed to report a list of apples suited to this locality; and on the 29th the committee reported the following list:

Summer Apples—Early Harvest, Red Astrachan, Red June, Duchess of Oldenburg, Benoni, American Summer Pearmain, Golden Sweet, Keswick Codlin.

Autumn Apples—Maiden's Blush, Lowell, Fameuse, (Snow Apple), Autumn Strawberry, Rambo, Fall Wine, Bailey's Sweet.

Winter Apples—Ben Davis, Jonathan, Domine, Rawles' Janet, Winter Rambo, Tolman's Sweet, Ortley (White Bellflower), Minkler, Milam, Willow Twig, Yellow Bellflower, Esopus Spitzenburg.

At the meeting of March 29th a subscription book was opened for stock in a canning and drying establishment, and forty-seven shares of twenty-five dollars each were subscribed. The amount was afterwards increased to $50,000.

The meetings, from March 29th to that of May 10th, were takn up in discussing the processes of canning and drying fruit and vegetables.

At the meeting of this last date the *modus operandi* of planting and cultivating raspberries and strawberries was discussed. W. H. Spurgeon recommended thoroughly cleaning out and mulching between the rows of strawberries, about two weeks before the ripening of the fruit. This would prevent the plants from becoming swamped in the weeds during picking season, and keep the fruit clean and the ground moist. Others favored mulching all sorts of small fruits. The methods described and recommended for setting out strawberry plants were amusing and instructive; all, however, agreed in one point, viz.: that they should be planted *in the ground.*

JUNE 6TH.—Messrs. Robbins, Case, and Spurgeon, being severally called upon, spoke of a new disease of the strawberry plants—a rust—which appears soon after a heavy shower, which is followed by hot sunshine. This rust or blight had reduced the crop fully one-third, and the vines struck with it had died, most of the old beds being entirely ruined.

This was the last meeting held in 1873.

W. H. SPURGEON,

ONARGA, Jan. 15th, 1874. *Corresponding Secretary.*

ADAMS COUNTY HORTICULTURAL SOCIETY.

OFFICERS FOR 1874.—*President*—James Shinn; *Vice President*—S. B. Turner; *Recording Secretary*—T. Butterworth; *Corresponding Secretary*—J. H. Hargis; *Treasurer*—Thos. Sinnock.

The proceedings of this Society have been published from month to month during the past year, in the *Western Agriculturist.* This is a flourishing society, doing good horticultural work.

PROCEEDINGS

OF THE

Northern Illinois Horticultural Society.

SEVENTH ANNUAL MEETING,

HELD IN

STERLING, WHITESIDE CO., JANUARY 27, 28, 29, 1874.

The Society met, pursuant to the notice of the President and Secretary, in Farwell Hall, on Tuesday, January 27, at ten o'clock.

The President, S. G. MINKLER, called the meeting to order, and introduced Rev. Mr. MOORE, who offered the opening prayer.

Dr. L. S. PENNINGTON then introduced Hon. Mr. BENNET, Mayor of the city, who, in a happy and appropriate manner, welcomed the Society to the city.

Ex-President SAMUEL EDWARDS, upon request of the President, responded in behalf of the Society.

PRESIDENT'S ADDRESS.

The PRESIDENT addressed the Society as follows:

Members of the Northern Illinois Horticultural Society:

BRETHREN—Through the blessing of Divine Providence, we are permitted to meet again at our annual love-feast; and it becomes us to render thanks to the Giver of all our blessings for His protecting care over us during another year, and in permitting us to meet in this thriving young city, on the banks of this beautiful river, with our ranks unbroken by death.

You have left your homes and your firesides, and gathered together at your own expense to contemplate those principles in horticulture that

are designed more particularly to benefit the rising generations, than for your own immediate profit.

But we should bear in mind that it is our mission here to provide for the rising generations, so "that the world may be the better for our having lived in it."

Let us take a view of what horticulture has done for this our adopted State. What is a country without fruit? And who have brought about the present condition of things? Gentlemen, you who are members of this Society have been the instruments in effecting the improvements we now see.

A little over forty years ago, I came to this State, and settled on Fox river, when this and that beautiful country belonged to the Pottawattomie Indians; with no roads, no towns, no survey, no railroad; all a vast extent of treeless, fruitless prairie. And it was thought, by the few inhabitants who were scattered here and there about the groves, that trees would not grow upon the prairies, "because they never had."

But among the sturdy yeomanry of the frontiers-men were some who had the taste and spirit for tree planting, and, thank God, some of them are with us to-day. Others have fallen asleep, "but their *works* do follow them."

In the year 1851, there was a company of horticulturists gathered in a town—now a city—east of us (Dixon), under the name of the Northwestern Fruit Growers' Association—the venerable and lamented Dr. Kennicott as its President. Though this was not their first meeting, it was the first one I attended. The spirit of horticulture burned within them; and not horticulture alone, but that of agriculture also, for *there* was the first conception of the State Agricultural Society. And they went forth about the work of tree planting, and what has been the result? Fruit of all kinds, not by the bushel only, but by hundreds and thousands of bushels; not enjoyed by the few only, but by the masses; and so plenty that it can be enjoyed at every fireside, to gladden the hearts of every household, promoting health and happiness.

Though we made many mistakes, others have profited by them; and it is now demonstrated that fruit and ornamental trees *will and do grow upon the prairies*, as we not only have luscious fruits for our daily food, but they have become an article of commerce. These changes—the production of fruits and the adornment of prairie homes by deciduous and evergreen ornamental trees—have been brought about through the influence of horticultural societies. Then let us look to the hope of our calling; it is a laudable one. Horticulture, or the love of it, is refining; it subdues the harshness of our natures; it has the same refining influence upon minds that religion has upon morals. Allow me to illustrate: A gentleman came to my house one day, and expressed much admiration for some plants which my daughter was cultivating. After the gentleman left, a little granddaughter, five years old, said, "I think that man loves his mother." "Why?" asked her grandmother, "what makes you think so?" "Because," said she, "he loves plants and flowers." And I think the child was not much out of the way.

Having taken a glimpse of the past, the future lies before us. And surely we have learned many important lessons, as well as made many mistakes, which may be of vast benefit to beginners, especially our mistakes, many of which are recorded in our transactions.

Following in the footsteps of my predecessors, I cannot urge too strongly the vast importance of forest tree planting. Our forests are fast receding before the ax man, and the future supply should be provided for. And all eyes are turned to you and other horticultural organizations for instruction and examples in this great work.

I am aware that it is seemingly a hard matter to induce people to plant forests, but if we can bring an influence to bear upon them which will lead them to consider the importance of planting live posts for fence in the North, where the Osage orange does not do well, we will have accomplished a part of our mission. I hope the subject will receive your consideration.

I trust, also, you will consider the importance of selling fruits by weight, instead of measure; the terms boxes and barrels have become so meaningless that one might as well say "as large as a piece of chalk."

I would recommend that each member be careful to maintain the integrity of the Society, and not mar the good name it has hitherto sustained and so justly deserves, by coming too hastily to conclusions; for our doings go before the world to be criticized, and they should stand the closest scrutiny. Therefore, when any measure of importance comes before this body every member should vote understandingly.

Man's ingenuity is great; he can build a gunboat, take a city, or conquer a nation; yet after all a tiny insect sometimes baffles all his skill and whips him out; at least so it seems to be with the codling moth; but I hope our State Entomologist is building the gunboat which will aid us in gaining the victory over the hosts of our insect foes.

We have had another severe trial of our faith; we have had a three years' drought, though there has been sufficient surface moisture to bring forth cereals and two good crops of fruit. But when old Boreas comes down from the north with his extreme cold breath, and finds the earth too dry to withstand him, the result is fearful to the horticulturist.

It is written, "in the sweat of thy face thou shalt eat bread;" and, as my friend Hammond says, "we must fight it out on that line."

I feel encouraged about our horticultural bill now before the Legislature, as the Governor has recommended its passage in his message; and I talked with some prominent members of the House of Representatives, when at Champaign, attending the meeting of the State Horticultural Society, who last winter opposed the bill, but who, after learning its nature and importance from Messrs. McWhorter and Galusha, promised to support it this winter.

I am not aware that any of our brethren have fallen by death during the past year. I would recommend that a record be kept of our deceased members.

In conclusion, allow me to call your attention to the fact that the American Pomological Society will hold its next biennial meeting in

Chicago, in the fall of 1875; also, that the great National Centennial Celebration and Industrial Exhibition, will be held in Philadelphia in 1876.

I would recommend the appointment of a committee to act in concert with the Board, or an authorized committee of the State Horticultural Society, in making suitable preparations for these important events.

Messrs. T. McWhorter, A. Bryant, Sr., and Samuel Edwards, were chosen a committee on the President's address.

TREASURER'S REPORT.

L. Woodard, Treasurer, presented the following report:

L. Woodard, Treasurer, in account with Northern Ill. Horticultural Society.

1873.		Dr.	Cr.
Jan. 25.	To cash received on memberships,.....	$141.00	
Jan. 25.	By cash for programmes.....		$ 6.75
" 28.	" " Stationery,.....		.25
" 28.	" " D. W. Scott, as per bills.....		52.50
" 28.	" " L. Ellsworth,.....		7.25
" 30.	" " Postage stamps,.....		1.00
Feb. 11.	" " Postage on circulars.....		1.75
Apr. 23.	" " Express on stationery,.....		.30
July 2.	" " O. B. Galusha, as per bill.....		26.75
Dec. 29.	" " D. W. Scott & Co., as per bill,		33.50
" 29.	" " Postage stamps,.....		1.00
1874.			
Jan. 27.	By balance on hand,.....		9.95
		$141.00	$141.00

Respectfully submitted,

L. WOODARD,

MARENGO, ILL., Jan. 27, 1874. *Treasurer.*

COMMITTEES.

THE PRESIDENT announced an auditing committee, consisting of Messrs. Douglas, Spafford and Kinney. Also, a committee on articles on exhibition, consisting of Messrs. McWhorter, Bryant, Sr., and Budd.

Mr. SPAFFORD, on suggestion of the President, moved the appointment of a committee of three to prepare and present business for the meeting. The motion prevailed, and Messrs. Douglas, Edwards, and L. K. Scofield were appointed.

On motion, the hours for meeting were fixed at nine A. M., and half past one, and seven P. M.

On motion, the Society adjourned until half past one this afternoon.

FIRST DAY.

AFTERNOON SESSION.

The Society convened, as per adjournment.

ORCHARDS AND VINEYARDS.

Mr. M. B. SPAFFORD, from the committee on orchards and vineyards, read the following report:

The cultivation of the apple, at the present time, challenges the attention of the public on account of its being called king of fruits in our climate. But as the word king is not used in this country to denote pre-eminence, we will call it President. Some may object to the use of this word just now, on account of the unpleasant odor attached to it, in its connection with salary grab and credit mobilier; but the Patrons and Farmers' Movement will remove all cause of fear on these accounts.

In the successful cultivation of the orchard, several conditions are necessary:

I. We should set none but first-class, western grown trees, in a healthy condition at the time of setting, and of varieties well adapted to the soil and locality.

II. Proper fitting of the ground and setting.

III. Good care and annual cultivation and pruning.

1. It will not be necessary, before this convention, to urge the necessity of western grown trees, but still it is a fact that thousands of trees are set annually, here in the West, from eastern nurseries, that are nearly dead, and black in the heart when set, and are doing more to injure our localities, and create an impression that this is not a fruit country, than all other causes combined; and I can but think that our nurserymen are to blame for not putting good, reliable canvassers into the field, to counteract and check this nuisance.

Adaptation to soil and climate is of very great importance, and I know no better guide for the man about to set an orchard, than to find the best one near him, and be guided by his neighbor's experience in varieties and cultivation.

By all means utterly refuse to listen to the blarney of a Yankee tree peddler, and remember how our first mother came out by listening to the first fruit dealer. Adaptation to locality is of very much importance here. There are localities where Esopus Spitzenburg, Westfield Seek-no-further, Rhode Island Greening, Northern Spy and Yellow Bellflower, do very well among us, and these are reported as unfit for general cultivation.

2. *Fitting the Ground.*—My practice is to back furrow the ground about twice, and leave the dead furrow about ten to twelve inches deep

where the rows of trees are to stand; then reverse the furrow slice, and throw up a ridge where the dead furrow was, about six inches higher than the natural level of the soil, taking care to harrow or cultivate the soil very fine. This makes a bed of mellow, fine soil, sixteen to eighteen inches deep. On this carefully set your trees, and by after cultivation the soil should be kept up the highest by the trees, so as to make good surface drainage. The soil should be kept mellow by the cultivator, and some hoed crop raised annually to shade the ground in midsummer. I know of no crop as good and profitable to plant in orchards as sweet corn. It may be planted at different times for six weeks, and fed to stock, or cured for winter fodder, and will bring more money than large corn. If preferred, peas may be sown, but should be left for the hogs to harvest; but in this country they should be sowed early to make a good yield.

Selection of varieties is of great importance, and one that will ever be a fertile topic for discussion. Experiments have shown that in producing new varieties from seed, the tree that grows the seed transmits the style of tree, the size of fruit, and degree of hardiness. The male parent, or the tree that grows the pollen that fertilizes the blossom, fixes the time of maturity of fruit, flavor and productiveness. The influence of stock upon the cion, in top grafting, have been known to produce greater changes upon the fruit than are to be found in many that we call different varieties. The Golden Sweet, grafted upon a tree bearing very sour fruit, has been changed to an insipid, tasteless apple.

Early Harvest, worked on a late variety, has been changed to a fall apple. More than forty years ago these were regarded as fixed and well known facts by us in grafting, and we were careful to observe them, and look to the kind of texture of wood, growth, habits of tree, etc., and many that did do this were often accused of fraud in setting varieties, after they came into bearing. Sweet apple cions should be set on sweet apple trees, and so in relation to sour ones; early apple cions on early apple trees, and late ones on late trees; color, size and resemblance, should be observed. Will not this account for what we often hear said about different varieties of Gilpin, Snow, Rawles' Janet, and Duchess of Oldenburg? And have not these sub-varieties been brought about by promiscuous root grafting? It seems to me that this field is one that we ought to stop awhile in and investigate.

The increase of noxious insects among us should receive our earnest attention, and I would inquire whether we cannot, by legislation, do something to prevent the wholesale shipment of the codling moth into our State from the East. One of the large fruit dealers in Western New York told me, this fall, that they sent them all here, for they would not have them in Boston, but always sent the barrels back that contained them, apples and all. Can't we take a sly hint from this? We can never hope to eradicate them here as long as they are shipped here in barrels by the hundreds annually. Shall we not see if this practice cannot be abated as a nuisance? The apple crop has not received the attention its importance demands. No crop of grain has produced one-half of the returns in money value that the apple has. I believe that by careful

selections and good care apple trees will pay for themselves at eight years from the root graft, and after that will pay twenty-five per cent. net on their value at five dollars each, as often as corn will produce fifty bushels per acre.

Vineyards.—If the apple is President among fruits, the grape is President-ess, or Mrs. President, as you please, and, like some of our Presidents' wives, who thought they were the President, the grape has by some been placed at the head of the fruit list.

The ground for the vineyard should be fitted about the same depth as for apples, and planted, if for cultivation on stakes, about six by eight feet apart, and to cultivate on trellis may be six by ten or twelve feet. With me, the stakes have been most profitable. Clean cultivation, mellow soil, and not too rich in humus, are requisites for good, rich fruit. If we are raising grapes for market, and don't care much for quality, only for size, we may make more fruit by manuring, but it will be at the expense of the quality, and for wines, the fruit will not be as valuable. My grapes give 94° to 100° by Oeschele's must-scale. At Herman, Missouri, 80° is a good showing. I have no doubt that the loess soils of our river bluffs are as good soil for the grape, for wine, as can be found anywhere; and I go further, and say I have no doubt that the grape can be profitably grown on any soil where corn can, and, at three cents per pound, will pay better than the corn. Ten pounds of grapes have generally made a gallon of pure juice for wine; but as our Society is not in the wine business, I shall say no more under this head, unless called for. Then I have no secrets about wine-making, and will say that I have made and drank wine for more than thirty years, and don't like whisky yet; nor has it killed me. The old poet sang:

> "On *foreign mountains* may the sun refine
> The grape's soft juice, and mellow it into wine."

This has lost its point with us, for we can raise our own grapes, and I would like to see every cottage, every dwelling, be it ever so grand, or ever so humble, surrounded by this noble fruit, yielding luxury and health alike to the rich and poor.

The Concord and Clinton are the only varieties that are reliable for the million, and these are mostly in cultivation. The first of these is rather a transient grape, but, by carefully packing, may be kept a month or two; while the latter is the great wine grape of this locality.

DISCUSSION UPON MR. SPAFFORD'S REPORT.

A. Bryant, Sr.—I have never been able to discover the peculiar influence of stock upon fruit which the report notices. I think the varieties of Red June and Striped June, also the two distinct varieties of the Snow Apple, are not caused by grafting. I have grafted the same sort upon all sorts of stocks, but do not find the stock to influence the quality of fruit.

MR. MCWHORTER—My experience agrees with that of Mr. Bryant; the time of ripening, blossoming, or leafing out is not affected, neither is the quality or size of fruit changed; for instance, the Rawles' Janet will not blossom or leaf out any earlier by grafting upon the Yellow Bellflower —a tree which puts out and blooms early. An apple grafted on a pear stock may be changed in color and appearance without a material change in the quality of fruit. Any thing that affects the circulation, may affect the fruit in size.

MR. MCAFEE—I have seen specimens of Ben Davis, grown upon Hyslop Crab stocks, which were inferior in size and insipid in flavor. I knew cions of the Wine Apple, grafted upon dissimilar stocks, which produced fruit quite dissimilar. I do not know why we may not believe the stock affects the fruit, for we know that the cion does affect the stock; the roots upon which are grafted different varieties, take on the habit of growth of the several varieties.

MR. MONTAGUE had had considerable experience in grafting; he had grafted different varieties upon crab apples, but had not observed that the stock affected the quality of the fruit; even a sweet apple so grafted retained its characteristic flavor and quality.

MR. BRYANT said he did not deny the statements made by Messrs. Spafford and McAfee, but regarded the instances as exceptions to a general rule. He admitted that the crab apple stock might affect the quantity of fruit generally, but that did not touch the question; as the wild crab is a different species.

Quite an animated discussion ensued, participated in by Messrs. Douglas, Wright, Spafford, Bryant, Powell, Woodard, and others, all agreeing that the cion influences the roots, but that the roots or stock do not affect the qualities of the fruit.

MR. DOUGLAS said that every variety preserved its identity upon whatever stock of the common apple (*pyrus malus*) it was grafted, but admitted that fruit would deteriorate when worked upon crab apples.

He stated that if a piece of bark be inserted upon the body of another variety of apple tree, the bark and the wood formed under it would retain their identity.

MR. BUDD, of Iowa, said he had once heard the claim made, as in the essay, that stocks would affect the quality of fruit, and had made quite extensive experiments, so as to arrive at the facts in the case; and the result is that he stands where Mr. Bryant and Mr. McWhorter do upon this question. He had noticed, however, that crab apple stocks affect fruit unfavorably. This had been proved in Vermont by extensive grafting upon these stocks, with a view of obtaining hardier trees; and it was found that the fruit deteriorated in quality so much that the practice was abandoned.

A member spoke of experiments with the the Bethlemite apple, which had been quite extensively grafted upon the wild crab apple, in one locality in Northern Illinois; but the fruit continued to deteriorate in size and quality, until it became, after five or six crops, almost worthless.

METEOROLOGY.

The President announced that the next paper in order was a report upon Meteorology, by Mr. Grove Wright, who came forward and read as follows:

Rock Falls, Jan. 27, 1874.

To the President and Members of Northern Illinois Horticultural Society:

All of my observations pertaining to meteorological phenomena, since the last annual meeting of this Society, have tended to strengthen my convictions that the views I then expressed in regard to an *electrical atmosphere* surrounding the earth, are correct, and of the utmost importance, not only in solving all the mysteries of electrical science, but in explaining the origin and progress of storms, and other atmospheric disturbances which properly belong to the subject of meteorology. Another statement which I then made, that the only effect of the passage of a current of electricity through any substance, aside from mechanical results, is *decomposition*, cannot be disputed, and thus, indirectly, electricity may have an important relation to vegetable growth. As I propose to confine my remarks at this time to the subject of storms, it may be necessary to first give a brief outline of my theory of atmospheric electricity, and the facts upon which it is founded. The whole theory may be stated in one proposition, viz., *Atmospheric electricity is a subtile fluid, surrounding the earth like an atmosphere, and is subject to the same general laws which govern other material substances.* This implies that it is a material substance, and that terrestrial gravity would cause it to be more dense near the earth than in the higher regions, which facts can be readily proved.

Attach a silk thread to an electrometer, and let it down to the earth from a chamber window. Now, as all fluids tend to an equilibrium, the density of the electricity in the electrometer will be equal to that of surrounding objects at the surface of the earth, and the leaves will not diverge. Draw it up suddenly to the window, and the leaves will diverge, showing a charge of positive electricity, because the air at this height has a less density of electricity than that of the electrometer which came from the surface of the earth. Touch the ball of the electrometer, and it will be discharged and remain in equilibrium with surrounding objects at this height. Then, if it be lowered to the earth without touching it, the leaves will diverge with negative electricity, showing that the density at the upper window was less than that near the earth. You must understand that positive and negative are merely relative terms—positive meaning an excess over equilibrium, and negative, a deficiency—and the same charge which was positive can be made to assume a neutral and even a negative condition. This experiment with the electrometer is only one of a number which all tend to demonstrate that, in a normal condition, the density of the electrical atmosphere decreases from the surface of the earth upward, according to the laws of the terrestrial gravitation. This alone should convince any one that electricity is a material substance, although

we may not be able to ascertain its specific gravity. As I do not propose to discuss this subject here, I will merely state that I hold myself ready at any other time to defend the proposition I have stated.

I presume the best article ever written upon the law of storms, is found in the *Popular Science Monthly* of Feb. 1873, by Prof. T. B. Maury, and certainly no one has had a better opportunity for observing atmospheric disturbances over nearly the whole globe. No one who reads that article will ever be led into the delusion that electricity has any influence in the origin or progress of a storm. I should as soon think of attributing the whirlwind to the leaves which are carried up by it.

The simplest form of a storm is a local thunder shower. On the afternoon of a still, warm day, when the ground is moist, an immense volume of invisible watery vapor arises from the earth, and continues to ascend until it reaches a cold stratum of air. Here it is condensed and we see the forming cloud, which at first is no larger than a man's hand. It rapidly increases in size and density, for the condensation of vapor causes a partial vacuum into which the surrounding air flows, and this being soon condensed the drops of rain begin to fall. The electricity which was carried up from the surface of the earth in the rising vapor, just as we carried it up in the experiment with the electrometer, is now in a region of less density and exhibits a charge that would fall to the earth by gravitation, as the rain drops did, only from the fact that the air is a non-conductor and resists its passage. Large quantities do no doubt ride down on the drops of rain, but the great mass is stored in the cloud until it finally bursts a passage through the air to the earth.

If the rising vapor should be very dense and warm, and the stratum above extremely cold, the condensation would be so rapid that the air would rush in from all sides to fill the vacuum with great force, and this would set the adjacent columns of air in motion towards the storm cloud, until, perhaps, in a few moments the air for miles around would be in motion towards a common center. For reasons which I will presently give, the air from the south would curve towards the east, and that from the north would curve towards the west, thus giving a vorticose or whirling motion to the center in a direction opposite to the hands of a watch. This would be a tornado, and no other storm, which does not gyrate within a few hundred feet, can properly be called a tornado. The destructive force of the tornado would naturally result from the tremendous pressure of air from all sides, and to the twisting, wrenching motion which every thing in its path must receive. The rushing currents which meet in this terrible encounter must find some speedy means of escape. They press into the earth and tear up soil, rocks, and massive roots of trees, but the resistance on all sides, and below, at last forces them upwards with the whirling mass of dust, trees, rocks, and every thing animate or inanimate which has been swept from the narrow track of the storm. This dense, rising column expands in its upward course, partly by the contrifugal force of its gyration, and also on account of the decreasing density of the atmosphere, so that it spreads out in the form of an inverted cone or funnel. The quantity of electricity which must be

carried up from the surface of the earth by this upward current can hardly be estimated, and would probably not be seen by those outside of the vortex of the storm, for it would most likely return to the earth in constant flashes, inside of the rising cloud of dust and vapor where the conduction would be best, and the air would offer the least resistance—on account of the vacuum caused by the vorticose motion. It is evident that the progress of the storm must continue just as long as the causes which produced it exist, to wit: moisture and rapid condensation. Still, if I had the time and you the patience, I think I could point out some circumstances which would either check or divide the vorticose motion, or give the storm a more general cyclonic character. Before speaking of the direction in which the tornado will probably move, I will explain, in part, a well established law upon which this would depend. The law is, that all currents moving in any direction, tend to the right of that line of direction, in the northern hemisphere, and to the left in the southern hemisphere. I will demonstrate this law by an illustration from physical geography, which will help us on our way in the study of storms. The heated air in the equatorial regions rises, and in the northern hemisphere floats towards the north, and this is called the *equatorial current*, while the colder air from the north rushes in, near the earth, to fill the vacuum thus occasioned, and constitutes the polar current. Now the whole atmosphere partakes of the axial rotation of the earth towards the east, and on account of the spherical form, that part which is near the equator has a much greater eastward velocity than the polar regions, consequently the equatorial current, which retains this eastward velocity, would, in its progress north, have a relative eastward motion over the surface of the earth, and for similar reasons the polar current, which has a lesser eastward velocity, would constantly swerve from the meridian upon which it started, and have an apparent westward motion. So if two columns of air on the same meridian, should from any cause move towards each other, as in the beginning of a tornado, they would not meet, but the one from the south would turn to the east, and that from the north would turn to the west, and thus they would pass each other by each turning to the right, and this alone is sufficient to account for the whirl and direction of the tornado. It will be readily seen that the eastward velocity of the south wind would be greater than the westward motion of the north wind, so that the whole gyrating mass of the tornado should take an easterly, or northeast direction. This course would, however, be greatly modified by the surface of the surrounding country, and if hills and forests should check the inflowing currents on one side, the vortex of the tornado would sway towards the obstruction by the greater force of the opposite currents. Thus you will see that there are no mysteries pertaining to this destructive meteor which can not be readily solved by the application of simple, natural laws.

The limits of this paper will only permit a suggestion to what is called an atmospheric wave, that sometimes sweeps over this whole country, generally from the northwest, but occasionally from other points of compass, as on the 4th of December, when it came from the southwest.

My suggestion is, that this wind is *always* a modification of the great equatorial current of which I have already spoken. In this latitude this current ordinarily moves toward the northeast in the higher regions of the atmosphere, and approaches the earth in the polar regions, and, as I stated at our last annual meeting, is the source of the *aurora borealis*, and, of course, is the origin of all our northerly winds. This current would approach the earth still further south as the sun recedes from the summer solstice, until by the time of the autumn equinox the aurora is frequently visible to us. A variety of causes may bring this current down upon us even as far south as this, and the result would most certainly be a cold southwest or west wind, such as occurred on the 4th of December. If the depression was further north, the course of the wind must depend upon a variety of local circumstances, but it would come to us from the northwest, north, or rarely from the northeast.

I wish to call your attention to one feature of these winds which has attracted much attention, and should, in the future, be the subject of special observation. I have reference to the electrical display which has given them the name of *magnetic storms*. According to my theory of an electrical atmosphere, this equatorial current should always be charged with electricity in the same proportion that it retains its watery vapor, and when the rain or snow from this current strikes the wires of the telegraph, the electrical effect will be seen in the offices in the immediate vicinity. This was the case at Milwaukee and several other stations, on the 4th of December, and has been observed in various places as a remarkable feature of these great storms. This not only furnishes an additional proof of the correctness of my theory, but by observation can be made a test of the source of the storm, and the direction in which it will probably move.

I would suggest that the committee on meteorology have a more systematic organization, and, if possible, be supplied with apparatus that will enable them to give the definite results of a series of observations of these magnetic storms, and to test the existence of an electrical atmosphere.

G. WRIGHT.

Dr. Pennington wished to make the subject of the essay practical, and asked Mr. Wright to explain the difference between heat and electricity, and how electricity, when in superabundance, affects living tissues, and how it operates in turning sweet milk into sour.

Mr. Wright explained that the effect of electrical action is always to decompose substances. In the case of the milk the air is decomposed and ozone developed, which produces the effect upon the milk. He said that if we go into the discussion of the relation of heat and electricity, it will lead us farther from our legitimate course as a horticultural society. He further explained that the direction of storm centers may be determined by observing the course of the wind; for instance, that to-day, the wind being east, a storm is approaching; if it changes into the south we know that the storm center is passing to the north of us; but if it

changes to the north, we know that the storm center is passing to the south of us.

THE PRESIDENT called for reports from the standing committee on

LANDSCAPE GARDENING,

To which Mr. Carpenter responded by reading a paper; but as it is not found among the manuscript sent the editor, it is necessarily omitted.

MR. E. HATHAWAY, from the committee, reported as follows:

Mr. President: I come before this audience with reluctance. I am a farmer, and have had very little leisure time to devote to the subject which I bring before you. I am only a very humble student, just in the rudiments; not in any sense of the word a master in the noble art of landscape gardening. But hoping—viewing the subject as I do, from the farmer's standpoint—that some word of mine may reach and influence the class to which I belong, I present the following thoughts:

Few farmers pay much attention to landscape gardening. Indeed, a disposition to rob the farm of its natural attractions, is quite prevalent. Noble old oaks, standing near fine building sites, are often as thoughtlessly cut down as one would cut the corn stalks which grow in a single season. One cannot raise such oaks in a lifetime. Convenience to the road, and handiness to the various out buildings, usually determine the location of the house, and both house and barn are forced up to the very edge of the public highway. Some of the finest and really most convenient building sites, so far as relates to the care and culture of the farm, are lost to their owners, because they are some little distance from the road. The house, usually barren of any expression of refined taste, and shorn beyond help, by its very situation, of that air of rural quietude and rest which should belong to the farmer's life, stares at the passer-by with an air of gossiping curiosity. In the small space between the house and the road—the front yard it is generally called—are placed all that is obtained from far and near, for the purposes of embellishment. The owner forgets how much room the trees and shrubs will need when grown, to give them individuality, and they soon expand into a state of crowded confusion. Sometimes, here and there a lonely little evergreen endeavors to thrust its green point up out of the deciduous thicket. Into this little yard, every thing is gathered, and the farm stretches away dreary and desolate. The usual adornment on farms is but an imitation of village grounds, and shares the same hampered and confined spirit. Instead of the broad, free life of nature, which should be expressed in rural landscape gardening, we breathe in these little tucked up yards the air of the town.

My object in presenting this paper is to suggest to the farmer some simple and natural plan for improving the face of nature; some way to surround his home with a great number of attractive objects, at little expense. One thing which has had the effect to keep back progress and culture in this direction, has been the prevailing idea that really fine

effects could not be produced without great expenditure of money and time.

When a young man becomes the possessor of a farm, let him lose no time before procuring young evergreens and deciduous trees from some responsible nurserymen, and setting them out in a small nursery. I followed this plan, and found it very satisfactory. A few hundred evergreens, as Norway and American Spruces, Balsam Fir, Austrian, Scotch, and White Pines, from six to a dozen inches high, will cost but a few dollars. Seeds of the most valuable timber and ornamental trees can be obtained at a trifling cost. Such a young nursery will really cost less than a few of the good sized trees which are usually purchased. It takes but little time to attend to it, and when one wishes to use the trees, a large number can be safely removed in a few hours, and there is little danger of loss even in a dry season. The farmer then has plenty of the best material at hand, and ready for use by the time he has selected appropriate localities; and if in the end he has more trees than he needs for himself, there are a plenty of people less provident who will desire them, and he will become not only the enricher and beautifyer of his own farm, but of the country around him.

The whole farm is his to enrich and beautify. It may be made attractive in the highest degree without taking in the least from its utilitarian productiveness. He should study to give all of his additions to the scenery an air of rural simplicity, and bring them into pleasing harmony with the surrounding landscape. As he walks about his farm, and as he rides to and fro on the public highway within view of it, and, indeed, from every available position, let him study the capacities of his farm for simple and natural improvement. A barren, unsightly knoll, which is an eye-sore to him, may become one of the chief attractions of the landscape, if crowned with evergreens. The evergreens, especially the pines, produce the best effect generally when planted in assemblages; and there is no better time to study the proper places for groups of evergreens than on the white snow fields of winter; one can tell then just where these trees will add the greatest charm to the place, and utility and beauty will generally be found pointing to the same spots. The evergreens are particulaly adapted to improve the winter scenery of Northern Illinois. Deciduous trees, as well as evergreens, have a finer effect in groups than when planted singly, though of course there are spots where only single trees would be admissible. The oaks are at home on the uplands, and there is no tree of Northern Illinois more picturesque and characteristic than the Burr Oak; the elms and willows are particularly fond of water, and if a stream runs through or beside the farm, they should not be denied a place beside it; the Sugar Maple is a fine tree, and seems adapted to almost any location in our landscape; there is no finer roadside tree; its dense, cool foliage, throwing a hospitable shade over the heated road in summer, and its bright autumn leaves laying a tinted carpet beside the fence, are recommendations in its favor for this purpose. There should be a woodland on every farm, both for beauty and utility: and if nature has not already provided for the owner, let him select a

locality for his forest, not only adapted to the wants of the species of trees which he plants, but where its fresh greenness and atmosphere of quiet seclusion will add to the rural delights of the farm.

We do not propose to go into any elaborate directions for the production of variety and harmony in the landscape; the more simple and natural the style the better, and the more perfectly will it be in keeping with the life of the farmer. Every farm has its own peculiar capacities for improvement, which should be carefully studied by its owner.

Few farmers who occupy unimproved land are able to build the permanent residence immediately, neither is it generally desirable to do so until the farm has been studied and improved; the building site, however, should be chosen, that all improvements may have a proper relation to this central spot; the temporary house may be placed in some convenient location where it will not interfere with the development of his plans. Give the prospective building grounds plenty of room, for no one can better afford this than the farmer. Trees, and sunny lawns stretching away among them, are indispensable to attractive grounds. If the grounds are spacious and somewhat elevated, and have a variety of surface, as knolls and hollows, groups of evergreens upon the knolls, as already suggested, with the sky for a background, as seen from the public highway, will show off to a good advantage. We should avoid injuring these undulations of surface, but render them more striking and attractive by a proper arrangement of both evergreen and deciduous trees. The more striking views of surrounding scenery should not be shut out from the house, for the best pictures one can have to look at are those that may be seen from his window. The view of a distant woodland, covered with the soft, green haze of spring, or the brilliant tints of autumn, is inspiring, and will often drive away care.

A house of symmetrical form, in an elevated location, is very attractive when seen from a distance against the sky, and should not be entirely obscured by trees.

Though it is best not to build the permanent residence immediately, the farmer need not wait to obtain means to build a costly and elaborate structure; we doubt if one in a thousand of the expensive houses built ever tell any other story than that of pride and money; the farmer wants a simple, yet tasteful structure, which shall express the comfort of rural life, simple, yet refined tastes, and warm, social feelings. Let it harmonize, too, in the most natural and unobtrusive way with the surrounding scenery; if one wants his house to correspond with nature, he must endeavor to catch her spirit; amid groves of picturesque old Burr Oaks, a picturesque house would no doubt be appropriate.

Some treat the picturesque as the opposite of the beautiful. Wilson Flagg says: "If a villa, with its dressed grounds, be not so picturesque as many a rude cottage, it is not because the one is rough and the other smooth, not because the one is homely and the other beautiful, for the cottage may surpass the villa in beauty, but because there are more poetic and romantic images associated with the cottage."

No material and no color, for residences, seem better adapted to our part of the country than our soft, gray, native limestones. They make a house enduring as the rugged bluff itself; one that future generations may live in.

We give these few crude suggestions, being fully persuaded that if the minds of farmers can be turned in this direction, they are not lacking in the good judgment or the fine poetic feeling which would make their efforts a success. The practical study of landscape gardening would improve our rural workers mentally to a degree which can hardly be estimated. The horticulturist and the landscape gardener, who are drawing attention to this subject, are among the true educators of the people. It is a grand thing to feel that one is a worker with God in beautifying the earth. Of course, some mistakes will be made: but in this, as in every thing else, it is practice which makes perfect.

One often feels shocked, on entering beautiful grounds, or an elegant house, to find that the soul of the owner does not correspond with his surroundings. Wealth can buy many things, but it cannot buy that fine harmony which makes one's surroundings a part of himself. To have this, the man must breathe into the scene his own breath of life.

The beautifying of homes would have a tendency to check the growing vagabondism of our people. Warner says that it is no wonder that people move from one fireplaceless house to another without regret; but it is certainly no wonder that they move from one unlovely, soulless farm, to another, with restless longing. If we wish to become attached to a place, we must make it a part of ourselves. The influence of agreeable surroundings on the minds of children, too, cannot be overestimated. The memory of some tree on the old homestead often lingers in the mind even to old age. In my own experience, the lofty pines that swung in the moonlight before my chamber window, have never lost their mystic charm. An old pasture, decorated with groups of spreading young pines, interspersed with sunny grass spots, where the cattle loved to feed, is yet as plainly seen by the mind's eye as when I called "Co-bos!" in boyhood.

Let the farmer make his home beautiful, and, if possible, introduce that highest form of beauty, the picturesque. Let him preserve nature's charms, and add to them. The memory of a home, which expresses the best faculties of the mind and heart, will live forever in the mind of the child.

MR. MCWHORTER thought that the prevailing practice of selecting the more level and uninteresting part of the farm for sites for the buildings, a serious error; the more broken and undulating portions being far preferable.

MR. WRIGHT asked if evergreens should be planted in straight rows; he thought not, agreeing with the essayist that they are far more effective planted in groups.

BOTANY AND VEGETABLE PHYSIOLOGY.

Mr. H. H. McAfee, from the standing committee on Botany and Vegetable Physiology, made the following report:

However much we may talk of "vitality," "constitutional perfection," "powers of endurance," and the like, it seems to me we can never reasonably expect a plant or animal to endure, unless it is in fair health, when its powers of endurance are to be taxed. And if, as happens to be the case with most plants in our climate, plants have to prepare themselves specially during one portion of the year, to withstand special vicissitudes and hardships of another portion of the year, it can easily be seen that good health, perfect physiological development during this time of preparation for hardship, is absolutely requisite, or when the hardship comes suffering must ensue.

In a climate like ours, winter possesses a wide range of possibilities. Compare the last with the present winter. Now we have had, except the vicious snaps of October and November last, an exceptionably mild winter. Though *minus* 22° has been reached in the State this winter, I venture to say that *that minus* 20° was not reached in a way that hurt trees and plants as a like thermometrical index has hurt them heretofore. But our winter as a whole has been mild, pleasant, and in very truth an Atlantic winter, while last winter was a Steppe winter.

I will not now stop to explain these terms, nor to enter upon the subject of meteorology, which properly belongs to other hands, though should time permit and you desire it, I may, before we separate, give you the conclusions of some study and observations upon that subject. I think that the experience and observations of horticulturists will bear me out when I assert that the behavior of the subjects of our care, in the different winters of about equal temperature, is often very different, showing that we must look farther than to winter for a cause adequate to the effects observed. A given very low temperature, may be very destructive or not very destructive of certain plant life, and whether it has been destructive or not depends upon some other circumstances than temperature alone, else when temperature was equal, results would be equal. Finding results unequal when temperature is equal, proves that it is not temperature alone that kills or injures.

There is, then, a difference in the amount of endurance shown by plants at different times, and it is for us to study why plants may at one time successfully resist and at another time succumb. Supposing that the plant has in its nature the propensity to perfect its character in every respect, to assume maximum powers of endurance, as well as to perfect its life cycle of growth and fruitage, if only the surrounding circumstances are favorable; it then follows that a plant failing in point of endurance, where under similar stress its powers of endurance were sufficient, must have been deprived in some way or hindered from perfecting this character of endurance.

If a farmer should let his cattle, horses, sheep, etc., go into a night of *minus* 40° temperature, in a half starved condition, he need not feel surprised if, in the morning, some of them fail to live. And if you or I happen to be underfed and weakened by abstinence from food, or deranged in our physical functions by the use of indigestible food, we should be poor subjects for exposure to arctic cold, or to violent changes of temperature in either direction.

I believe that starvation weakens all vitality, and plants and animals stand together in subjection to this proposition. Hence, if a plant goes into winter in a starved condition, it must give up and die with a hardship which would be little felt by it if it had been in a full-fed, perfect, physiological condition.

But the animal is a constant feeder, (except, of course, the hibernating animals,) and his digestion, assimilation and supply of waste, is a constant quantity, while the plant must not only do in summer all that is requisite for its prosperity during the current season, but must also do at that time all that is necessary to fit it for hibernation, and also for its assumption of growth in the spring. From the time that the leaf falls in autumn till it is reproduced in spring there is a restricted, but still constant evaporation of moisture from all parts of a tree above ground, except when the air is in a condition of saturation. Whence comes the moisture to supply that evaporation, and still leave enough behind to keep the cells and vessels well filled? Suppose the roots are every one of them encased in solid, frozen ground, which must be the case with many young trees in our climate, at least in some seasons. There must be some provision of supply within the tree. There must be some chemical reaction brought about by the winter cold which forms liquid from the solid matter already in the tree. The behavior of the maple and other sap-flowing trees supports this surmise, and upon no other hypothesis can I explain the facts evident in tree hibernation. The maple, if tapped before freezing weather in autumn, will be found comparatively dry of sap, while experiment has shown that a root may be cut off at each end in spring, and when the temperature is right will flow copiously from each end. Then if the temperature is lowered it will cease flowing, and when the temperature is again raised the flow will begin again and continue till exhausted. This supply of moisture for evaporative purposes, in case severe freezing cuts off the supply from the earth, must be provided for then by the storing away of some solid from which the water can be produced; some solid, which either holds as constituent parts of its substance hydrogen and oxygen, which it can spare when the low temperature releases them, or some solids which, by mutual reaction under the influence of low temperature, give rise to new bodies, of which water is one. But there is a far greater want to be provided for by every hibernating plant before it reaches winter, and that is the food upon which growth is to be started in spring.

An effort of wonderful power must be made by the tree whenever it is warm enough in soil and air in spring. It must increase the already formed parts of every bud to many hundred times their original size, and

it must begin the young roots before it can feed from earth or air to any great extent. But to make those leaves, and to make these rootlets, and above all to make flowers, the trees must have stored away a large food supply. From the time when growth ceases in summer till the season is ended, the whole work of the plant is to prepare itself for winter and for a good start in the spring, and if circumstances are favorable, for the office of reproduction. Of course, those who have been observing have seen that growth in all directions does not cease simultaneously. First the limit of length is reached; next the diameter finishes its increase; and herbaceous tissues are changed to woody tissues, and it is probable that the last act of growth in the fall is the perfection of the internal structure of the bud. But as important as is present growth, the provision for wintering and future growth is equally important, and if the plant is prevented from making that provision by any circumstances of privation, it may suffer. The tree with cells empty or partly empty of starch and other necessary plant food to organize into leaves in spring, cannot do well even if a most favorable winter allows it to live over, but if the poor starveling must battle with the dry northwest winds which are hungry for its life juices, and with the cold which collapses its poorly filled cells, what wonder that it dies.

Now in the light of these principles we can see why the cold and changeable winter that followed the excessively dry autumn of 1872, might easily give us a crop of dead and dying trees in the spring of 1873. Suppose that the trees grew during the growing season of 1872; when the time came that plant food for the young leaves and young roots of next spring was to be organized and stored away, there was such a lack of moisture about the roots that they could not supply the tree with the requisite quantity. Not enough food or not the right quality could be stored. The tree could not make hydro-carbonaceous bodies without hydrogen, any more than the Egyptian slaves could make the brick without straw; and that beautiful autumn of 1872, without mud, without moisture in the soil for several feet in depth, gave the poor trees no chance to lay up their treasures for the beginning of the new life next year. A little more water in the fall would have given the tree a chance to go into winter with its exhaustive evaporation and its severe cold, like a strong man goes forth to battle armed at every point and filled with courage.

I saw a row of peech trees, at Champaign, which ran from high into low, rather peaty soil. The high part had done best prior to 1872; since that the low part has done the best. Before 1872, there was an occasional killing of limbs upon the peaty soil, and the general health of the trees seemed to be suffering, but last winter killed the trees on the high land which had not been before injured, and the trees in the bottom lived over winter, bloomed, grew well, and bore some fruit. Those trees, before furnished with an excess of moisture, had not too much in the fall of 1872, and yet they had enough to enable them to ripen up their wood for the hard coming winter. I have listened to many reports that trees ripened up their wood well in the fall of 1872; but I fear the term ripened is not well used in such cases. If it is meant that they ceased to grow

early, and that their leaves ceased to act early, I will agree with that; but if we mean that they became fully prepared to resist the rigors of winter, and to resume growth next spring, I do not think that was so. I think it was only in specially favored spots, where from some cause there was the most moisture, and enough to furnish the wants of the tree, that true ripening of the wood took place. It may be that trees thrive in soil as "dry as dust," such as Mr. Meehan asserts is found in forests, while the soil outside the forest is damp. But if that is so, it must be in a region far from ours, both in miles and characteristics. This "dry as dust" condition, which Mr. Meehan has described as the normal condition of forests, has given *us* a most woful crop of tree corpses all over the West. *Minus* 28°, it seems to me, should not harm most of the trees that we had been depending upon as hardy, if only those trees were in a really thriving condition; but if they were sick with hunger or thirst, why should not that *minus* 28° kill them?

From these premises, I draw the conclusion that the peculiar phenomena of the action of the last winter, upon trees and plants, are not due to the unusual severity of the cold, nor yet to the sudden adverse changes of temperature, but to the fact that the matter of hardiness, as previously tested, seemed to have little to do with the results, which fact points to the adverse influences of the previous season as the true cause of the deplorable results. I do not believe we should make such an abnormal season the basis upon which to predicate hardiness or tenderness in any tree; for if a tree is short of nourishment, it is also short of endurance, and unless we calculate upon dry falls, followed by cold winters, we need not pick out the trees which stood last winter as hardy, and those which failed as tender.

I am not prepared to prescribe measures to avert a calamity like that of last winter, in any specific manner. But I will offer the idea that our soils are gradually growing more and more deficient in humus and in all organic substances, which, as the years progress, are slowly decaying and losing their organic character. Thus where the new prairie of twenty-five years ago was so much supplied with organic remains that the mechanical condition of the soil suited it to retain moisture a long time, it was much better than it is now; that some prairie, though not broken or disturbed till now, shows qualities very inferior to what it did twenty-five years ago. It is as rich, but it is dryer, and will not, except in very favorable years, produce the grain crops it did then. The humus which then played the part of the sponge as to moisture, and in whose interstical spaces all chemical combinations took place more readily than they do in soil, is gone; its mineral parts alone remain, and the soil lacks that sponginess and porosity which allows it to retain moisture a long time, and to imprison and retain the gases of the air. There is little doubt that much of our soil, if not most of it, is deficient in organic substance, and I think we may seize every economical way of supplying the organic elements needed, with benefits to our soil, and eventually to our finances. It may be that our fruit trees do not need the ammonia of stable manure, and perhaps they do not need all of its carbonic acid gas, but they do need it in its rotten, well divided

form, when it is about to become mere humus, and they need that or some other organic substance pretty liberally supplied.

I do not recommend this in view of manurial qualities, but as a mechanical amelioration, and as such I think any decaying organic snbstance can be applied to our soils with profit. Those who are so situated that they can readily and economically obtain peat or muck (and I suppose you all know what each is, and how they are distinguished) will find that repeated annual dressings will be most beneficial, and as a drought preventive, I am convinced nothing is better.

Mr. McAfee's paper elicited an animated and interesting discussion, participated in by Messrs. Bryant, Galusha, Pennington, Minkler, Douglas, Scofield, the President, and others, all of whom, except Dr. Pennington, attributed the damage to fruit trees to the three consecutive years of drought, followed by the severe and continued cold of the last winter; the trees being reduced in vitality, also by overbearing. These discussions being similar to those upon this topic at the State Society's meeting, already published in this volume, they are mainly omitted here. (See reports of Vice-Presidents; also, discussions on pages 148–159.)

Dr. Pennington thought that the death of so many fruit trees last season was owing solely to the two causes of reduced vitality from overbearing, and the succeeding intensely cold winter.

Mr. Galusha explained that the excessive dryness of the soil—one of the causes to which the damage to trees has been generally attributed—could be prevented by mulching in June; also recommended the planting of groves to check the force of the winds, which greatly accelerate evaporation, and which also, in an intensely cold atmosphere, conduct the heat from the trees with great rapidity.

Mr. McAfee contended that no rule of hardiness of varieties could be predicated upon the experience of the last year, as the conditions and effects were abnormal. He would not recommend planting trees on low, wet ground, neither on very dry ground with a loose, gravelly subsoil, but on ground not deficient in either moisture or humus, that the trees may be kept in a healthy, vigorous state.

Mr. Douglas stated that he had some trees on a very dry, gravelly soil; and that if these trees go into winter with the soil very dry, they are sure to be damaged, while others, on a more compact soil, moderately moist, are uninjured.

Mr. Suel Foster, of Iowa, attributed the damage to the intense and long continued cold, freezing the trees dry—as a wet cloth will freeze dry if hung out in an intense cold air.

Mr. Scofield and others differed from this view, as there were several instances cited in which the roots of trees were found dead last spring, while the tops were fresh, and cions taken from them and grafted grew well.

On motion, several persons were constituted honorary members of the Society. (See list of members.)

The Society then adjourned till seven o'clock this evening.

FIRST DAY.

EVENING SESSION.

The Society convened, as per adjournment, with the President in the chair.

The discussion was resumed, during which

MR. BUDD stated that Prof. Mohr, of Germany, had been investigating tissues of plants and insects, and found that the particles of water in the cells may be so minute—so finely divided—that they will not freeze; and that where they are not so finely divided as to escape frost, the roots will perish or the plant or insect will die.

He said that on examining damaged trees we find the bark and the cells immediately under the bark healthy, while farther inward the cells are ruptured and the tissue diseased; which shows that the former were, and the latter were not, in proper condition to enter the winter.

MR. MCAFEE said that hardiness depends upon cell structure, and that damage by cold depends upon the motion of the air, quite as much as the degree of cold; as in a period of cold of definite duration the damage is not as great if the air is calm, as in another period of same temperature and duration accompanied with a strong northwest wind; for it is well known that a northwest wind is "a very drying wind," as it is called; and evaporation takes place rapidly under it. He claimed that barometric pressure, also, has much to do with the drying of vegetation, and consequent damage by extreme frost.

He explained the circulation of sap through cells instead of by capillary attraction, as formerly taught; 'said the theory of the formation of albumen at the extremities of medullary rays has been proved a fallacy, for he had known instances in which the bark had been started off the trunks of trees so that there was no direct connection between bark and wood, and yet the growth continued on the inner bark, and woody fiber was ultimately formed there.

He said the action of frost in winter, upon the sap of the Sugar Maple and other sugar producing trees, seemed to have the effect of changing starch into sugar.

MR. BUDD said the vigor or hardiness of varieties of trees depends largely upon the leaves; if these are healthy and perform their functions well through the season, there is seldom damage to tree or vine by the winter. He instanced the Tetofsky apple leaf as always perfect, hence this tree was never known to be injured by the winter. New varieties of grapes, whose leaves did not retain their color and perform their functions through a drought, could not be depended upon as hardy.

A long discussion took place at this time upon the Red Cedar and its varieties, resulting in the general admission of the following points:

There is a variety of Red Cedar, called the Tennessee Red Cedar, which is not hardy in the northern part of the State. It abounds in some of the southern counties of the State, and is found in sheltered positions as far north as Bureau county. It comes true from seed, and hence was thought by Mr. McAfee to be a species; it has a white heart instead of red, as is that of the common Red Cedar. The spray of the tender species is more slender and smaller, the leaves farther apart, and the fruit is only half the size of the common species.

ORCHARDS AND VINEYARDS.

O. B. Galusha was called upon to read a paper on Orchards and Vineyards, and read as follows:

Mr. President: In reporting upon Orchards and Vineyards, as requested by the Secretary, I will endeavor to avoid speculative theories, and confine myself mainly to such facts, and deductions made from those facts, as will give promise of practical results or economic value.

I.—APPLE ORCHARDS.

The present status of orchards in Illinois is truly deplorable; yet the causes which have led to the diminished vitality of fruit trees was so thoroughly discussed at the recent meeting of the State Horticultural Society, that I will not dwell upon them now, only referring to them to glean lessons from them.

We have doubtless all become convinced that to have healthy and productive fruit trees we must begin with the very germ or seed, using only those which are from a hardy stock of progenitors; and that every step in the work of rearing the tree and cultivating it in the orchard must be taken with care, that neither too much nor too little stimulation be given it, so that it may be kept in a condition of moderate growth, and that it shall be kept free from depredating insects.

Having selected our seeds from the fruits of the most enduring varieties, we must also select cions not only of varieties which are reputed hardy, but from individual trees which are healthy; for all history has proved that in the vegetable, as well as in the animal kingdom, the diseases of the parents are perpetuated in the offspring.

But as I am to write of apple trees and apple orchards, I will not begin generalizing so much as to include other species of trees. Let us look at the past and see what there is in the history of orchard culture in this State, from which we can glean practical lessons for future guidance. Those of us who began twenty or thirty years ago to plant apple orchards in Illinois, can hardly call up again the enthusiasm which marked every

step, and the hope that cheered us on. How sanguine we were that we would soon see on almost every farm in Illinois a large and flourishing orchard, which would each year produce enough for the family of its owner, and many barrels for shipment to our large towns and cities, of such apples as Red Junes, Hockings, Summer Queens, Fultons, Fallawaters, White Bellflowers, and a host of others. We soon found that *some* varieties were not adapted to our peculiar soil or climate; yet were there not a hundred varieties from which to select, which *had been tried* and proved to be reliable here, even at that early day? These anticipations were pleasant, and doubtless served the purpose of preparing the way for finding out, in after years, our ignorance and folly. Probably not more than one tree in five of all those planted in that early day has repaid for the care and expense, to say nothing of our chagrin at the loss or failure of all the others to meet our expectations.

Why have so many varieties, which for a time seemed to succeed, failed?—or, what were the causes of failure? This is a question very easily asked, but not so easily answered; yet we may and do know some of the causes which are within our control, and can provide against like failure in the future by conforming, in our selection of varieties, and modes of culture, to the conditions of tree, of soil, and of climate. Even those causes of failure which we have been wont to attribute to the severity of the winter, or some other dispensation of Providence, we can now forecast, and prevent the recurrence of their effects. We have learned that it is safest and best to plant but few varieties, and those which have thus far best withstood all hardships, and are best fortified, both in the nature of the tree and its fruit, to repel or overcome the attacks of insect enemies.

We have also learned the fallacy of one of our earlier theories, which was to keep away all enriching substances from the soil under and around our apple trees. We have found that trees are more liable to be starved to death, or to that degree which invites disease and insect depredators, than they are to die or become enfeebled by surfeit from overfeeding.

The practical question, therefore, comes to us here, How shall we manage our trees so as to keep them in the best possible condition to endure all sorts of hardships—such as we cannot prevent—and yield us remunerating crops of fruit?

First—We must understand the nature of our soil, and adapt varieties to the soil; for we find a marked difference in regard to adaptation. For instance, the Winesap and Early Pennock will succeed better on naturally level, rich prairie soils, than many others, while these varieties are almost worthless on light land underlaid with sand, rock, or gravel, where the Fameuse and the Domine would prove profitable, if properly fed. No soil, however, contains a sufficient and proportionate supply of all the ingredients for the proper nutrition of both tree and fruit for any great length of time. Fresh prairie soil, rich in humus, does not require for many years the application of barnyard manure, yet upon these soils it has been found that the application of lime and wood ashes increases the quantity and improves the quality of the fruit. Even the rich prairie soils, however, do in time fail to furnish sufficient food, as seen in the

decline of orchards from which crop after crop of cereals or grasses has been taken, and in the revival of the trees, the renewing of their youth, which takes place when the soil of such orchards is thoroughly pulverized and well manured. I have witnessed these declines and transformations—rejuvenations—in numerous instances.

Second—We must adapt the form of our trees to the requirements of our climate.

I am aware that the old story of high heads *versus* low heads is about worn out, with its thousand repetitions, both pro and con; yet the experiences of the best orchardists fully establish the fact that apple trees, with branches so arranged as to shade their trunks and the ground over their large roots, are the healthiest trees to be found in the State; and while it is annoying sometimes to be unable to drive the team close up to the trees in plowing, or the wagon under the larger branches when gathering the fruit, these annoyances are more than compensated for in the healthy appearance of the trunks and larger limbs of the trees, and in luxuriant foliage, which, after having done its work in building up the structure of the tree, and elaborating nutritious juices which have been stored up in bud and germ for the next year's growth and fruiting, fall to the ground, and lie as a slight mulch upon the surface, to hold moisture and to prevent the too deep freezing of the soil, instead of being blown away and piled in heaps, leaving the ground naked beneath the trees, as is the case with trees of the "Shanghai" or long-stem kind.

Having traveled to the extent of at least twenty thousand miles in this State, within the last twenty years, and generally with a view to examining the conditions of fruit plantations, I speak from personal observations of orchards in all situations, and of all forms of trees, when I say that I do not believe that one apple tree in ten, in the north half of the State, upon whose tall trunk the sun shines throughout the year, is not diseased upon the south-west side of its trunk; while with trees whose trunks are shaded by the low branching limbs, diseased bodies are the exception and not the rule. Again, the fruit is not as liable to be blown off from the low trees, and what does fall is not as badly bruised.

No one who has kept his eyes open has found any difference in fruitfulness for a series of years in favor of the tall trees—the only exception in productiveness in favor of this form of tree being instances of badly diseased trees, which have exerted all their energies to propagate their species as largely as possible before their exit from tree-life.

This provision of nature for the continuation of the existence of species has deceived many an orchardist into the opinion that these really death throes of his trees were indications of a healthy condition; for why would they bear such crops, and perhaps for two or three consecutive years, if they were seriously diseased? I apprehend a large part of the testimony which has been given in favor of the productiveness of tall-bodied trees, in Northern Illinois, has been given from such data at this; whereas the same witnesses, a few years later, would undoubtedly testify that the "hard winter," or "the rascally borers," or "bark lice had destroyed their best, most prolific trees."

The last year has developed phenomena in our orchards, both new and startling, yet which may be traced to obvious causes. If we recall the situation of orchards, and the forms of trees which have suffered most from the extremes of temperature combined with the extreme drought, we will discover that, as a general rule, other things being equal, the greatest fatality has been among trees standing upon ground exposed to the extremes of drought and deep freezing.

Low-head trees, by shading the ground beneath them, have prevented the extreme heating and drying of the soil in summer, and thus the extreme depth of the frost last winter did not affect them as seriously as those whose roots were imbedded in a dryer soil; for we all know that severe freezing of an orchard soil, if it contains about the right amount of moisture to promote healthy tree growth, will not injure the trees, when the same degree of frost in a soil almost destitute of moisture would destroy them.

This fact gives us a clue to the explanation of some other facts which have been used with great confidence as evidences—proofs in fact—that protection by groves or belts are injurious to, and that northern slopes are advantageous to, orchards. It has been found that in the same orchard, which extended over a ridge or hill, to the north and south of it, the trees upon the northern slope have survived the terrible ordeal of the past year better than those on the southern slope; yet we can readily see, from the light of the generally observed and admitted facts above named, that the exposure really had nothing to do with these results, further than that the soil upon the southern slope, exposed to the almost vertical rays of the sun, became very much dryer than that upon the northern slope; and hence when the roots of the trees were imprisoned by the frost of the last winter, in this "powder-dry" soil they were inevitably destroyed. While upon the other slope, the soil being in a better condition, the trees suffered far less. While it is doubtful if, in the life of the youngest orchardist, a succession of three year's extreme drought, followed by a season of enormous fruitfulness, and this by nearly sixty degrees of frost, may ever recur again; yet the fact that such a combination is possible should lead us to consider well the subject of keeping the soil in a damp state by mulching or otherwise, and also lead us to select orchard sites not having an abrupt southern slope.

Third—Protection by groves, or belts of trees. Upon this head I shall say but little; and this little will be to simply reiterate the opinions, founded upon extensive observations, which I have so often given during the last fifteen years, viz.: that a due or proportionate mixture of woods and cultivated lands is more advantageous for orchards than an open prairie country on the one hand, or a closely walled in field on the other. I am not disposed to quarrel with the Darwinian theory that to produce a race of animals or stock of trees fitted to endure certain hardships we must select our individuals for such stock or race from those whose progenitors were exposed to, and yet not fully able to withstand, such hardships; or, in other words, the theory that the offspring are better fitted to endure hardships to which their progenitors were exposed, than they

themselves were; for as a rule this seems to be a provision of nature to perpetuate the various races and species in both these kingdoms, and is not antagonistic to the general law of hereditary descent. Yet "the mills of the gods grind slowly;" and although seedlings grown from seed of an isolated Rambo may be a little better fitted to endure the sudden changes and great extremes of our northern climate than the parent, it would take, perhaps, scores of generations of such trees to develop a class of trees as hardy as the Siberian apples, Duchess of Oldenburg, Tetofsky, etc.; and the practical orchardist is seldom inclined to experiment in directions like this, where his success is at best very remote, partial or doubtful; he prefers, and wisely too, to take such varieties, and plant in such situations, and protect from the extremes of climate in such manner, as give most promise of success. And it is always safer to predicate success upon the history of past experiences and observations, than upon untried hypotheses, however reasonable they may appear to be. Hence it is the practice, and I think a good one, too, for orchardists within the bounds of this Society to select seedlings of the so-called "iron clad" varieties, for stocks upon which to graft, rather than take promiscuous seedlings; and to engraft varieties upon them which are known to be hardy, rather than take the chances of success with those whose record for hardiness is not so clear.

Fourth—Pruning. Some hints have already been given, which, if heeded, would lead to correct conclusions in reference to pruning. Nature always provides for the shading of the trunks of trees; when they grow from the seeds in isolated places they are furnished with side branches from the ground up, when not destroyed by animals; but when they grow, as they usually do, in groups or groves, these side branches drop off, as they are not needed for the protection of the trunks, or become smothered by over-topping branches; and this provision gives *timber* for the use of man, but not the abundance of fruit which is produced upon the bushy, isolated trees. We plant orchards for fruit, and not for saw-logs; and the rule holds good, in the main, that where apple trees are pruned, from their youth, to tall bodies, the owner gets less fruit, though he may secure a better rail cut or saw-log than if the side branches had not been pruned off.

Pruning induces the multiplication of "water sprouts;" hence, if a system of orchard pruning is commenced, it must be continued indefinitely, or the result would be an impenetrable thicket in the tree head. There are but few varieties, such as Willow Twig, which, if left to themselves, will form heads so dense as to prevent gathering the fruit. Such, and only such, require an occasional opening of passage ways for the fruit gatherer. The plea of thinning out the middle of the head to let in the sunshine upon the fruit and limbs contains more moonshine than sunshine, for the truth is, we want a good crop of foliage, and *so distributed that the sun may shine upon it*, in order to have the best fruitage; and nature usually attends to this distribution when man does not interfere.

There is only one series of conclusions to be drawn from what has been written, which I will briefly give to conclude this part of my paper.

1. Select young trees for orchard planting whose stocks and grafts are from varieties which have succeeded in similar soil and location.

2. Plant in early spring, in good, mellow and moderately damp soil.

3. Cultivate, adding manures where needed, so as to keep the trees in a healthy, moderate growth.

4. Allow the side branches to remain sufficient to break the force of the sun's rays upon the trunks of the trees, or keep them partially shaded even to the ground.

5. When the trees come into bearing, furnish them with nutriment, and prevent, by mulching or otherwise, too deep drying or freezing of the ground. The oft-recommended plan of growing clover upon the ground, and letting it remain as a mulch, is perhaps as good as any. If this method, or that of mulching, is adopted, however, a slight mound of soil must be raised about the base of the trunks each fall, to be removed in spring, to prevent damage by mice; or the grass or mulch may be cleaned away for about two feet all around.

6. Prune no more than is necessary to admit of gathering the fruit; and, I will add,

7. By all means, so pinch off or shorten in, *while the trees are young*, such branches as tend to form crotches or forks, as these would almost certainly split off when loaded with fruit.

II.—VINEYARDS.

Vine-growing in Northern Illinois receives but little attention from the large majority of farmers, yet it is literally true that every one of them may, with but little labor and expense, "sit under his own vine," and that, too, during the season of fruitage, loaded with palatable, health-giving fruit.

The few words I shall say upon this topic will be in the direction of demonstrating how this fruit—the grape—can be cheaply grown, what place it should occupy in the list of the farmers' products, and how it can be used beneficially.

Any soil which will produce a fair crop of corn will produce a crop of grapes, if provided with drainage, either natural or artificial; simply throwing the ground into ridges before planting the vines is sufficient to draw the surplus surface water from the roots. These beds, or ridges, should of course be sufficiently wide, and the furrows between sufficiently deep, to effect the purpose of allowing the rain to filter through the soil and pass off in the gutters.

But there is, perhaps, not a score of farms within the bounds of this society upon which there are not vineyard sites near the dwellings, where draining is unnecessary to produce crops of Concord grapes. The soil should be deeply and thoroughly prepared, yet not manured at first, unless much worn out; the vines should be planted in rows north and south only, if trellises are to be used, or both ways if stakes. Eight feet

apart is a good distance for the rows running north and south, and six feet for those running east and west, if rowed in this direction. Trellises will be found more convenient for those who cannot or will not take the pains to train and prune their vines so as to keep them in proper bounds to fasten to stakes. Three wires, narrow strips of lumber one and half inches thick, or small poles, will answer for supporting the vines; and almost any kind of cultivation, except deep plowing close to the vines, will answer to produce a good crop, at least such cultivation as will produce a crop of corn; and there is nothing about the care of the vines more intricate or more difficult to learn than to learn how to grow corn or potatoes. And further: thirty pounds of grapes can be grown ready to pick as cheaply as a bushel of potatoes can be grown and put in the cellar.

Let two of the strongest canes, which start from as near the ground as any, grow for the first year's fruiting, pinching back all others occasionally, during the summer, at "odd spells," if it can be conveniently done. In after years, from three to six canes may be left, according to the strength of the vines and the distance apart. These canes may be allowed to lie along the row, or be looped up; they will get firmer if tied up as early as the last of July. At the approach of winter, after hard frosts, cut off the canes which have borne fruit, down near the base of the young canes left for next year's fruiting, cut off all other canes, if not previously rubbed off, which start out below the base of these canes, and cut these back, the first year after planting, to three feet; but afterwards they may be allowed to be five or six feet, and allowed to fall upon the ground. The side shoots upon these canes should be cut back to three buds. In the northern half of this district, it is essential, except with Concords and Clintons, to scatter a little hay or corn stalks over the canes, or bury them with a few inches of earth. In spring, as soon as danger of severe frosts is over, take them up and tie them up to the trellis, spreading them so that the fruit which comes out from the side-shoots will be as well distributed on the trellises as may be. Very little, if any, summer pruning is needed on these canes; but if large, nice clusters are wanted for exhibition or market, two, or at most three clusters only, should be allowed to grow upon a spur, and the young shoots pinched off just above the second leaf beyond the outside cluster. But if left alone, and with only once tying in the spring, a good crop of Concords, Hartfords, or Ives, is almost certain.

Delawares require a little more care than the stronger growing kinds, and I have found that a little better drainage is required for them, and a somewhat richer soil. A little refuse from the tannery, consisting of spent lime and hair, mixed, as it is thrown out, produces marked effects in the product of a Delaware vine, if sprinkled upon the surface around it.

The cost of taking up, cultivating, and covering in the fall of fifty vines—which are enough for supplying an average family with fruit—will

not exceed four dollars per year, and they will produce, at the lowest estimate, three hundred pounds of grapes.

There is probably no fruit grown in this latitude which contains more health-producing properties, as food, than the grape.

The fruit can be used in its fresh state from the first of August, in this latitude, until the first of January. The clusters intended for late keeping should be not over-ripe, clipped off with shears, the damaged or defective berries picked out, and the clusters laid away in shallow boxes, not more than three clusters deep, with cotton batting between, placing them so that they will not come in contact with each other, covering the whole and placing in an upper room or closet, where they will keep cool—as near the freezing point as may be—without freezing.

Those housewives who have canned grapes, almost universally prize this fruit as highly as any—peaches not excepted.

The following is the most approved mode: Take grapes ripe, but not over-ripe, and slip off the skins, which is very rapidly done by taking each berry between the thumb and forefinger, throwing the skins in a dish by themselves, scald the pulp and rub it through a coarse sieve, to separate it from the seeds, then mix pulp and skins together, and can as other fruit.

I will say to those who have not tried this mode, that they need not consider it as experimental, and therefore put up the fruit sparingly, for fear of failure; as there is little doubt all will be used before the ripening of strawberries the next summer that may be put up.

This fruit is pre-eminently alterative and corrective in its effects—even much more so than the most highly recommended patent medicines, and is, perhaps, on this account, better relished and appreciated in the spring than any other; and, if used habitually and in moderation, will greatly conduce to health.

I am aware that this paper contains very little, if any thing, that is new; but it is found to be necessary to reiterate truths in practical horticulture, and exhibit them under different lights, to persuade the owners of the soil to plant and use such fruits as are sure to repay them for their labor, and promote health.

I will conclude by exhorting every owner and occupant of soil, even if it be no more than a village lot, to plant and care for a few grape vines. They may be planted close beside and fastened to any fence or building except upon the north side—where they will flourish, and will repay for labor bestowed upon them.

After a short discussion upon protection for orchards, vineyards, etc., in which nothing new was elicited, the Society adjourned till nine o'clock to-morrow morning.

SECOND DAY.

MORNING SESSION.

The meeting was opened at nine o'clock—prayer being offered by Rev. Mr. Mason.

The PRESIDENT, being requested by vote of the Society to appoint a Committee on Printing, announced as such committee—Messrs. D. W. Scott, L. K. Scofield, and O. B. Galusha.

Mr. DOUGLAS, from the Auditing Committee, reported as follows:

REPORT OF FINANCE COMMITTEE.

Mr. President: Your committee, to whom was entrusted the Treasurer's report for examination, respectfully report that we have examined the same, and the vouchers for the several items of expenditures, and find the same to correspond, and to be correct.

ROBERT DOUGLAS,
M. B. SPAFFORD,
SAMUEL EDWARDS, } *Committee.*

An invitation was received from the Sterling Free Library Association, offering the use of the library to members during their stay; for which a vote of thanks was returned.

The following communication from Geo. W. Minier, of Tazewell county, was then read:

PEACHES.

Can peaches be successfully raised in Central and Northern Illinois? Yes, by careful attention to the following rules:

1. Plant your seed where the tree is to grow, and never remove it. Bud with a good variety the first year.

2. Prune the top very low, allowing the lateral branches to grow near the ground, and at the same time so near the surface of the earth that a light covering of soil may be spread over them by bending them down and covering the uppermost branches with almost any sort of material. Corn stalks are a good article for the purpose.

3. To kill the grub (borer) remove the earth from the roots a couple of inches, and pour boiling water on the affected parts.

4. Never suffer your trees to grow above your reach. Careful cultivation is needed to insure the best results. A thinning out of the fruit, when too thickly set, is important.

In this way every family may have this most delicious fruit.

A paper was also read from Mr. G. P. Peiffer, of Wisconsin, but not forwarded for publication.

A communication from Mr. James G. Soulard was read by the Secretary, giving the history of the Soulard crab, christened by the Jo Daviess County Horticultural Society as "Soulard Hybrid American Crab."

It originated in a wild crab thicket, near an apple orchard, twelve miles from St. Louis, Missouri. He—Mr. Soulard—introduced it over thirty years ago, and had cultivated it ever since. Several attempts had been made to raise seedlings from its seeds, but they did not do well. He had tried this variety as a stock upon which to graft other varieties, but after a few years fruiting, the sorts worked upon it had died. He thinks that its larger size than the common wild crab, "its lessened acerbity, decreased aroma, the texture of its flesh and fewness of its seeds, indicate strongly that it is a hybrid." He claims that "it makes the best, strongest, clearest cider of any apple, either American or Siberian, within his knowledge." The tree is productive, and the fruit yields three gallons of juice to the bushel; and this Gallized to six gallons, by use of sugar and water, has sold at seventy cents per gallon at one year old. He writes that the fruit may be shaken from the tree, and kept in a cellar as safely as Irish potatoes, until spring; that the fruit is good for culinary purposes—jams, jellies, etc.; that the tree is as hardy as an oak; and, on the whole, a valuable tree to plant in the extreme northern part of the State.

This article, coming from an intelligent fruit-grower, *over seventy-five years of age*, called out considerable discussion. Several members present were acquainted with this tree and fruit, and with the exception of Mr. McAfee, thought it a variety of the American crab, and not a hybrid.

Mr. McWhorter said he had known wild crabs as large as this variety; had seen some growing wild in the crab thickets, bearing fruit of light color, and with a blush upon one side.

Mr. McAfee was inclined to the opinion, for the reasons given in the paper, that it is a hybrid, and of some value for the North.

Mr. McWhorter presented the following

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Your Committee on President's Address concur in the general spirit of the address, and feel assured that the good sense and ability manifested in it is fully appreciated by this Society.

We heartily concur in the earnest recommendations on the subject of timber culture. We feel it to be the duty of this Society to continue to urge this important question upon public attention. We have thousands

of acres of lands, that are too broken to be of value for continued cultivation, that can be most profitably used for timber culture.

On the utility of live posts in the more northern portions of our State where the Osage Orange is uncertain, your committee consider this subject worthy of public attention. And also this may be recommended in other parts of the State, along railroad lines where hedges are liable to damage from fire from the locomotives. It is believed that the European Larch, and perhaps also the American Larch, is well adapted to that purpose. Other species from our own forests may be worthy of trial for the same purpose.

We also concur in recommending to this Society to use an influence in having all our fruits sold by weight; as under our present system it is often very difficult to learn from market reports the actual price of fruits in our markets.

Respectfully submitted.

TYLER McWHORTER,
ARTHUR BRYANT,
SAMUEL EDWARDS,
} *Committtee.*

Mr. Foster said he was glad that this Society, as well as the State Horticultural Society, is in favor of selling fruits and vegetables by weight. There is such a law in Iowa.

Mr. McWhorter thought the Iowa law was deficient in that it defines how many pounds in a *bushel.* He thought the word bushel should be abolished, as it only suggested an approximate amount, unless defined in pounds; and if so defined, meant nothing of advantage either to buyer or seller, as it is the number of *pounds* that regulates the price.

Mr. Foster gave the weights of fruits, as established by law, in Iowa, as follows: Apples, pears, peaches, quinces, forty-eight pounds per bushel; grapes, currants, cherries, gooseberries, forty pounds per bushel; raspberries, strawberries, blackberries, etc., thirty-two pounds per bushel.

Dr. Pennington favored the plan of using live posts for fence.

Mr. Minkler exhibited a section of a cotton-wood tree with the end of a rail inserted, over which the tree had grown about six inches. This rail was sawed square, the bark hewed from the trees, and the rail fitted in and held in place by nails, "by toeing in," as it is called. He recommends the use of European Larch for live posts. In thirteen years the trees will do for railroad ties, cut off above the fence. He has planted larches eight feet apart, and intends to spring in stout boards, and also use one or more wires in connection. He has good fence made in this manner.

Mr. Powell would plant larches eighteen inches apart and make a live fence. He believes in the White Willow for this purpose; has seen a good willow fence cut off five feet from the ground after growing five or six years; it is the best fence in Whiteside county.

Mr. Bryant spoke favorably of the plan of Mr. Minkler; would use rails, by cutting a slight groove in the side of the tree, and fit the rails in tightly; the European Larch is good for this purpose, because the sparks

from locomotives will not set the leaves on fire, as they will those of other trees. Has tried Yellow Willow for fence, but some of the trees died out when cut off, as spoken of by Mr. Powell.

MR. WIER—The only objection I know to the larches for live posts is that they will not survive continual cutting off; we don't want tall trees for fences.

Here ensued quite a lengthy discussion upon the qualities of the European Larch. Several members attested to the fact that young trees, before they had formed heart-wood, were no more durable for grape stakes, etc., than other varieties of durable timber; they had rotted off in five years or less. Is was admitted on all hands, however, that the heart-wood of the European Larch, grown on dry land, is as durable for posts or railroad ties as any known wood; the only serious objection raised was that it was not valuable for fuel, it being difficult to induce it to burn.

In answer to a question of the success of cultivating Black Walnuts upon high prairies, Mr. McAfee said that he had examined a forest on high prairie, planted sixteen or seventeen years ago, which showed growth and bore a good crop of fruit.

MR. WHEELER had a plantation twenty-five years old—trees now sixteen to eighteen inches in diameter; he had transplanted the trees at one year old with success. He regards the White Walnut as a very valuable tree; these trees, too, he had transplanted successfully at one year old: the first year they outgrew the Black Walnuts, but afterwards were not as fast growers as trees of that variety.

THE PRESIDENT announced that the Society would then be favored with the reading of an essay by Mrs. Hathaway, who came forward and read:

OUR NATIVE FLORA.

BY MRS. P. V. HATHAWAY.

The Oak openings, as they appeared in the pioneer days of Northern Illinois, were peculiar, and had a very characteristic vegetation. Even sixteen years ago, in some places, they retained much of their pristine beauty. The wide-armed Burr and White Oaks still dropped their leaves and acorns on the spots where they had fallen for perhaps a century. In May these open woodlands were aflame with the brilliant red of the Painted Cup, or Indian Pink as the children call it, the gorgeous yellow of the Alkanet was everywhere seen, and along the sides of the ravines bloomed the fragrant American Cowslip, the *Dodecatheon Media* of the botanist. This is one of our finest wild flowers, and I doubt if its near English relative, which Shakspeare praises, excels it in beauty or sweetness. Here, too, flourishes the handsome *Phlox pilosa*, occasionally showing pure white blossoms in place of the usual reddish-purple, and in some secluded spots, the larger yellow and showy Lady's Slippers. The wild Rose of June opened everywhere, the wild Orange-red Lily held up its cups to the sun, and August and September gave their tribute of Asters and Goldenrods. But these lovely children of the soil are passing away

beneath the rude hands and heavy feet of the white man. He looks upon the land and they melt away. Sometimes, in an unimproved field, they still flourish as of old, but every year I find some species, once common, more difficult to obtain. The parasitic Painted Cup, which was once one of the plentiest of blossoms, is now almost rare.

The lowlands, and banks of the creeks and rivers, have a somewhat different, but equally fine vegetation. The wild Yam, with its prominent-veined heart-shaped leaves and winged capsules, that do not open to let out the imprisoned winged seeds until almost spring, and the Moonseed, with its roundish peltate leaves and large clusters of fruit with a blue bloom hanging like grapes, are often noted. The fertile vines of the Moonseed are much less common than the sterile ones. Then there is the wild Balsam-apple, which springs up here and there in rich alluvial soils, and starting out on a tour of observation, goes traveling over weeds, bushes, and even trees, until from July to autumn—its season of blossoming—great patches are covered with its white bloom. The bees love it, and come thronging from every quarter to these spots. As it comes at a season when bee forage is often scarce, perhaps it might be of some value as a honey plant. Here grows the Virgin's Bower with its plumed clusters of seeds, and the Bittersweet with its scarlet fruit. In such localities we shall find the Panicled Dogwood with its white berries and red fruit stems, and the Osier Dogwood with its long red shoots. On these lowlands blooms the unfailing wild Rose in the wildest profusion. I have often seen great pacthes radiant with bloom, and the color varied from deep rose to pure white. In the moist soil, close to water, is found the Meadow-sweet, which puts forth its leaves very early in the spring, and its panicles of tiny white blossoms in June. A little higher up in the sandy banks grows the Nine-Bark, a fine shrub with umbels of white flowers which are extremely sensitive. When plucked they usually droop and will not revive though placed in water almost immediately. Here flourishes the fine Meadow Lily and the splendid Turk's-cap Lily, though the latter is quite rare.

In these moist places, the Mints find a congenial home. One of the most beautiful of these, is the False Dragon-head, with its satin-glossed lanceolate leaves, and somewhat bell-shaped purple and rose-tinted flowers in long terminal spikes. Last season I found a plant somewhat resembling this in color and general appearance, but both calyx and corolla were very deeply cut; the leaves were mostly in whorls of three, and more sharply toothed than those of the False Dragon-head. I have not found a description of the plant in Gray's or Wood's Botany.

These lowlands are the place of the Milkweeds. The dark, red-blossomed Swamp Milkweed grows where the soil is quite wet, and the Common and Green Milkweeds where it is drier. I believe all of our Milkweeds prefer lowlands, except the Butterfly-weed, which often grows on the dry uplands. The blue-blossomed Lobelias and the many-colored Figworts are found here. Occassionally one will find the plants of the diœcious Glade Mallow, but it is quite rare. The Pulse family is well represented; Wild Peas, Wild Beans, and Tick-trefoils grow luxuriantly.

The beautiful Partridge Pea appears beneath the river banks in large masses, its blossoms looking like golden butterflies, and its leaves so sensitive to the touch, that when the plant is carried a few minutes in the hand they become tightly closed. The bumble-bees seem to have a lease of these flowers, and hum about them in great numbers. The juicy-stemmed Jewel-weeds, or Touch-me-nots, love low spots, and in the late days of summer, the humming-birds make them hourly visits. So intently are they engaged in probing the nectar tubes that they hardly notice one's presence, and I have seen their ruby throats and green backs flashing just beneath my hand.

In swampy places the Iris shows its sword-like leaves and blue blossoms. I have found a variety of the Blue Flag, with creamy-white, very sweet-scented blossoms. If the water of the swamps have some depth, and remains throughout the season, the Pickerel-weed, the Arrow-head, the Water-Plantain, the Water-Crowfoot, the Yellow Water-Lily, and that lovely little member of the Gentian family, the Buckbean, will anchor fast, and make a flower garden.

In the lowlands we find most of the hundred and one species of the Composite family. Tall, golden Sunflowers sway hither and thither in the late summer winds. I have seen, occasionally, plants of the species *Grosse-serratus*, which produced a remarkable number of rays, so that the heads appeared like double roses. The *Lepachys pinnata* grows in great profusion; its long, drooping rays make it quite ornamental. This plant also shows a tendency to increase the number of its rays. In September the Goldenrods are out in full force; some of them are very handsome, and one has sweet-scented foliage. As these begin to fade, the white, blue and purple stars of the Wild Asters appear in every nook and corner. And lastly come the Gentians, mostly robed in brilliant blues, and fearing not the nights of frost. If I were a fairy, I believe I would choose a Fringed Gentian to live in rather than a rose or lily. But we must not tarry longer in the open lowlands, though a multitude of bright blossom faces are asking me to mention them.

The botanist has a feast always spread in the true woodlands. Our forest trees, and, indeed, nearly all of our trees, are early bloomers. The Basswood, which I think is the last to open, blossoms in the early days of July; the Poplars are gray with tassels in April. During the last seven years, in which I have kept a record of the time of the leafing and blossoming of many plants, the common Poplar has varied about twelve days in the time of blossoming, being in bloom in 1871, on April 2, and in 1872, on April 14. During the same time the Crab-Apple has varied at least three weeks. The Red Maple is an early April bloomer, and many of the Willows are golden about the same time.

The leafing of the trees is a subject of interest to me equal to that of their blossoming. On the expanding leaves of many species appear the same tints that distinguish them in autumn. The young leaves of the White Oak are tinged with purple; those of the Scarlet and Red Oaks with red.

In late April and early May, when the leaves of the trees are unfolding to the music of the wood-thrush and the red-eyed vireo, a whole train of the pet flowers of the woodland appear. The white starry blossoms of the Bloodroot, the delicate Spring Beauty, the Sessile Trillium, the Wood and Rue-Anemones open almost everywhere, and the White Dog's-tooth Violet appears in the moist ravines. Near streams the Lungwort shows its red buds, changing to brilliant blue as they unclose.

In such woods the more rare and secluded of the Orchids bloom. In early spring one sees an occassional ovate ridged leaf which has survived the cold of winter. In May a slender flower stalk comes up, and at its summit soon appears a spike of odd-shaped brownish blossoms. This is the Putty-root, or Adam-and-Eve, as it is often called—it is rather rare. At the same time you may find the two waxen leaves and lovely rose-tinted flowers of the showy Orchis, and in July, if the woodland drops down to a swamp, you may be able to secure a spike of the elegant Purple-fringed Orchis. Let me wander away for a moment. I have seen the little Ladies' Tresses, *Spiranthes gracilis*, its flowers looking like a spiral twist of pearls around the slender stalk, growing among hazel bushes very plentifully one season, and then disappear from that locality, so tender and retiring are these shy children of nature.

In the wood may sometimes be found that waxen-white plant, the Indian Pipe, about our only species of the Heath family. Here, too, I find that rare plant of the Buckthorn family, *Rhamnus lanceolatus*, a tall shrub growing in swampy spots. It has greenish, inconspicuous blossoms and small but conspicuous red fruit.

On the limestone bluffs along our rivers are found many of our most interesting plants. One of my favorite walks embraces a bold bluff on the Pecatonica river; up whose steep face climbs the trailing Ground Yew, *Taxus canadensis*. This evergreen, which grows abundantly in high northern forests, is found here only in favored spots. Branches, which are well shaded, are as fresh in January as in June. One is always trying to reach these bright shoots at the risk of one's neck. I find the Yew in bloom early in April, and about midsummer the fruit is perfected in the form of lovely little carmine drupes, each having an opening at the summit which shows the single seed.

Among the protecting little Yews grow a multitude of tender things. Here the Bishop's-Cap hangs its rows of fringy little bells; occasionally a big, snowy Trillium lifts its three-pointed crown; the queer, cup-blossomed Wild Ginger lays its soft, velvety leaves close to the moist soil; the plumy fronds of the Bladder-Fern swing in the lightest breeze, and the Maiden-hair, colored to the finest shade of green, hangs out a hundred little banners on one slender, shining flag-staff. The delicate Cliff-Brake, *Pteris gracilis*, drops its little fronds down over cool beds of green moss, and its near relative, the purple-stemmed Rock-Brake, grows on the very face of the sterile rock, possessing a sturdy life that resists the drought of summer and the freezing of winter; while traveling onward, step by step, or rather leaf by leaf, in the mosses, is the elegant Walking-leaf Fern.

Here grow the creamy-blossomed wild Honeysuckle, the wild Grape, and the Round-leaved Cornel, the finest of the Dogwoods, except the Flowering. I have not found this Dogwood in any other locality. In May, high up at the edge of the cliff, like bells on a tower, swing the blossoms of the Wild Columbine. Close at hand, on a more gentle descent to the water, are several fine young Shad-trees. A tree thirty or forty feet high, of this kind has grown up in a crevice in the face of the steep bluff. This is the earliest bloomer of our large Rose family, and expands its snowy blossoms in April. In the time of leafing and blossoming this is one of our most elegant plants; the silky texture of the young leaves, the downy pink stipules and snowy flowers, are fine enough to satisfy the most exacting taste. Among the Shad-trees, Oaks, and Large-toothed Aspens, which grow on this gentler descent, rise out of the fallen leaves in April, the many-tinted blossoms of the Liverleaf.

At the very edge of the most precipitous part of the bluff, and overlooking the Yews, once stood a number of venerable Red Cedars, but irreverent hands have cut them down. As I walked there last April, I plucked a spray from a lonely little tree which still remains. As I shook it lightly, the tawny pollen rose in a fragrant cloud of incense.

In the thin, warm soil of the crest of the bluff, grows the first blossom of the year, the modest Pasque-flower. I have found it there and in similar localities on the latter days of March. Often the frost hangs on the purple-tinted buds, which are not graced with even a single leaf, only with a hairy green involucre. The tardy leaves wait for warmer days. In the ravine that borders the bluff on its landward side, flourish many lovely plants. Here, in June, you will find the little Bush-Honeysuckle in bloom. In May the Flowering Fern, *Osmunda Claytoniana*, shows its snowy-white, wooly balls, through the soil in large clusters. The wool, on exposure, soon changes to a fine cinnamon tint, and the balls unroll into long, handsome fronds, with the fertile leaflets near the centre of the fronds.

There is no sweeter place to sit, in May, than on the crest of this flower-gemmed and evergreen-scented bluff, and listen to the tremulous song of the rose-breasted grosbeak in the oaks, and the soft lap of the waters on the stones at the base of the cliff.

THE CULTIVATION OF FLOWERS.

The Secretary read the following essay, by MRS. HILLIS, of Dixon:

A member of this Society, whose interest in human welfare is crowning his silvery locks with perpetual youth, has invited me to write an essay for this occasion. Can any thing new be said to induce our busy, practical people to give more attention to ornamenting their homes by scattering, with a liberal hand, nature's choicest treasures about their grounds? The necessary knowledge to cultivate the most delicate annuals is contained in the Floral Guides, that descend upon us like forest leaves in autumn. So neglect is not for the lack of information of the *modus*

operandi. Nor can it be for the lack of means; for where but a few years since the children of the pioneer contested their right to sunshine and air with the domestic animals around the door of his rude cabin, now extensive farms and comfortable homes appear, many of them supplied with all the elegancies of our city mansions. But few homes nestle beneath the shade and shelter of majestic trees, where the tables are supplied with fruit fresh from the trees and vines, where a well-kept lawn, interspersed with shrubbery and flowers, invites its inmates out into the bracing atmosphere and health-bestowing labor that is required to perpetuate this loveliness. Is it not rather for the reason that, as a people, we appreciate only that which gives a quick return in dollars and cents? The unfolding of our highest capabilities is little thought of. At fairs, thousands of dollars are offered for the fleetest horses and finest animals, possibly a hundred for floral exhibitions and fine arts. When we realize that material wealth is not the greatest blessing, more attention will be given to the arts and sciences, and all that tends to refine and elevate humanity. Then will the villager value each foot of land about his home too highly to have it overrun with weeds and rubbish, when a few hours, now spent in idleness, will cause every inch to yield fragrance and beauty, not only to himself and family, but for his neighbor. He is a public benefactor who plants trees and shrubs about his own home, even:

"Scatter seeds of the beautiful,
By the wayside let them fall;
Plant a rose by the cottage gate,
A vine by the garden wall."

The citizen must be content to entwine his windows with delicate vines; he may curtain them with living green, gemmed with hues more brilliant than diamonds, that no tapestry can equal. The solitary farm house, too often a prison for the self-sacrificed wife and mother, should, of all homes, abound in vine-wreathed porticos and flower-gemmed lawns. On our thinly populated prairies we cannot enjoy the lecture, the lyceum and concert, nor can we participate to any great extent in social gatherings. But the iron steed makes haste to bring the great outside world to our door; its lectures, conventions and histories, all cheer our winter evenings. And if we will, we can enliven every leisure moment, adorning and rendering cheerful these otherwise dreary homes, with simple, cheap and beautiful emblems of purity and contentment, which, combined with the sweet wild-wood notes of myriad songsters, the waving grain, shimmering in the sunshine, and the contented herds grazing in the meadow, or resting in the shade, constitutes a home such as all poetical minds look forward to as the highest felicity this earth affords. A few such homes may be found, where the happy families are united in weaving chains of memory, more precious than gold, enduring as life, binding them to each other and to their homes. Would there were more such. Every mother has a right to a plot of well-prepared soil for herself and little ones to cultivate in floral treasures, and should enforce that right. Children are not utilitarians, and in order to secure their services, work must be rendered attractive. They love the beautiful, and it is astonishing how

young they will become adepts in planting, transplanting, weeding, and watering flowers. They will become familiar with their names and habits, and delight in them as the more experienced cannot. Very few who are early trained to the cultivation of fruits and flowers can be allured from it by the idle and ignorant. Idle dreaming, foolish jesting, and injudicious reading, will have little fascination for them. Our most elegantly furnished homes fail to yield the pleasure anticipated, for the reason that the eye wearies of inert beauty and elegance. The feet may press the carpets of rarest patterns and finest texture; upholstery be of softest velvet; the walls hung with paintings, executed by the old masters; statuary adorn the halls, and yet the spirit unsatisfied. Flowers furnish variety and change. Some writer has said, that in order to be happy we must have something to do, something to love, something to hope for.

They also furnish these requisites. They are to a home what fruit is to the feast, music to the social gathering. The sculptor thrills with delight as he developes his form of ideal loveliness from the marble block; also the artist, as stroke after stroke of his brush, places upon the canvas some real or ideal woodland scene, with its green hills, its mountains mantled with their hazy blue, the flower-spangled valley with its little brooklet meandering through, or the peaceful lake reflecting the moss-covered rocks and bending willows with their long, wavy plumes. At best, these are but imitations of the work of the Great Artist, while every blossom is fresh from the storehouse of infinite beauty, inimitable in form, in the delicate feature of its leaves, in the blending of its hues, and, more than all, in its fragrance, commanding reverential worship from all spirits in harmony with the Divine attribute of beauty. The cultivation of flowers arouses a desire to investigate nature in all her varied manifestations, to understand the laws by which all this beauty is developed. Whoever listens to her interior voice has food for the mind at all times, and under every circumstance.

It is an ever-open volume through which all true wisdom may be derived. To such there can be no stronger attraction than is found in the deep woodland shadows; what eloquence, what melodies borne on the silvery wings of the fragrant air; surpassing the finest oratory; sweeter than the poet's song; holier than the voice of prophecy; more beautiful than the halls of art.

The everlasting hills and flower-gemmed valleys speak. The whole universe has its divine language, its million pages of celestial eloquence. How blest the silent inspiration of such a retreat, where the noise and discord of a world is lost in the conscious rapture of an interior life, and the soul holds converse with the wise and pure of all ages; with the exalted minds and loving hearts that have left their footprints on the sands of time as beacon lights to us.

Several members spoke of the esthetic value of floriculture and horticulture. The plan of introducing the theory and practice, to a limited extent, of these branches into our common schools was favorably presented and received. The experiment of planting beautiful evergreens on

the school grounds had, in several instances, been tried by members, and the pupils had come to consider them as a part of their property, to protect and care for. It was thought that beds of flowers, bulbs, etc., could be introduced into such grounds with a good effect; for if the teacher would inculcate the love of flowers, the children would soon learn to prize the efforts taken in this direction for their enjoyment, and would take delight in cultivating, for a few moments each day, during the season of flowers, these beautiful adornments.

Mr. Edwards said he had looked forward with hope that our State Industrial University would make horticulture a prominent branch of the education of farmers' sons and daughters; there had been a good beginning there, yet he learned with regret that a retrograde movement had begun there, which, if followed out, would soon bring this branch of education into disrepute there. He said he referred to the dismissal from service, by the Board of Trustees, of the orchardist and gardener, and the effort or determination to put the horticultural department under the same management as the stock farm.

The Secretary then read a brief article from Dr. Shimer, of Mount Carroll, as follows:

The Colorado Potato Beetle has been more prevalent than usual, this year, in Carroll county, which, with the dry weather, has made it necessary for us to import potatoes from another State.

The Codling Moth has been about as prevalent as usual. I have seen very many Siberian crab apples affected by it this season.

The Canker Worm is by far the worst insect we have in this county; it is spreading from orchard to orchard, and doing much mischief. It is remarkable that so many orchards are affected by an insect, the female of which is supposed to be, in all cases, wingless. Several old orchards have been entirely ruined by this pest.

I advised, and recommended through our county papers, the use of tin bandages, as described and recommended by our State Entomologist. Dr. Wm. LeBaron; but just at that time a patent tree-medicine-man came into town and succeeded in duping the people into a trial of his applications, which resulted in a failure. In my opinion the canker worm demands the most serious attention of every apple tree grower in the country.

Grape Leaf Lice are not numerous, and do little harm.

Apple Bark Lice are no longer a cause of great alarm.

I was greatly annoyed, last summer, by a species of gray blister fly on Honey Locust hedge plants, which kept the foliage off the plants in the hedge row, preventing their growth, and killed the young plants in nursery. They begin at some point and clean off the foliage from the row as they go. Their yearly presence would make the growing of Honey Locust as a hedge plant a failure.

The discussion which followed the reading of this paper was quite animated, as the spread of the insect foes of the fruit-grower seemed to be alarming.

MR. REED said, when the canker worm gets established in an orchard the owner may as well bid good-bye to his orchard, as it will not pay to fight these worms. He had been fighting them in New Jersey ever since he was a boy, and could make little progress against them.

MR. SLADE said that we Americans are persistent fighters, and we will not let the canker worm whip us.

Messrs. Foster, Budd, Spafford, and others, took part in this discussion, but as the facts and arguments brought out were very similar to those already published in this volume, they are omitted here. [See discussions on pages 102–104; also, reports upon entomology.]

MR. BUDD explained the device for catching the canker worm, invented and used by Mr. James Smith, of Des Moines, Iowa, as follows: A strip of heavy paper, about ten inches wide, is put around the body of the tree, with the lower edge eight or ten inches above the surface, and tacked to the tree; the paper is then coated with coal tar, a mound of earth thrown up around the trunk of the tree, covering the lower edge of the paper; after which the upper edge of the paper is rolled over outward, but not so as to come in contact with the mound. The earth keeps the tar from soon drying up, and the inverted trough of tarred paper prevents the worms from ascending the tree.

On motion, the meeting adjourned to half past one o'clock this afternoon.

SECOND DAY.

AFTERNOON SESSION.

The Society convened at half past one o'clock.

THE PRESIDENT called upon Mr. A. Bryant, Sr., of Committee on Forest and Ornamental Trees, for a report, which he presented, reading as follows:

REPORT ON TIMBER-PLANTING.

In the present condition of forest culture in Northen Illinois, a report upon timber-planting can offer but little that has not already been

said. Progress in this respect is extremely slow. Since the writer, in an address before the oldest agricultural society in this State, in 1850, first urged upon the farmers the importance of tree-planting on the prairies, the subject has been persistently pressed upon public notice by the horticultural societies of Illinois. The idea of forest-planting is becoming popular; and as its inception was gradual, there is reason to hope that its influence will be lasting. Sudden and violent outbursts of zeal seldom produce permanent effects—witness the White Willow fever of a few years since. One enterprise of the kind, well worth notice, has been undertaken, during the past year, by Robert Douglas, of Waukegan, who has begun to plant a tract of three hundred acres with forest trees, upon a system which, if successfully carried out, will do much to determine and illustrate the best mode of proceeding.

In the present report remarks will be made upon three or four of the most useful forest trees suited to the climate of Northern Illinois. The planting of the White and Burr Oak, the Black Walnut and the Butternut, is, doubtless, well understood by all who have paid any attention to the subject. The White Ash is one of the most important timber trees in the northern parts of the United States; but, unfortunately, is not so easily raised from seed as those above mentioned. If the seed be sown soon after gathering from the tree, without drying, it will come up well in spring; but if dried, a great part will often fail to vegetate the first year, even if kept through winter in damp sand—care must be taken not to cover too deeply. Probably forest trees, as well as others, often fail from this cause. When self-sown, they commonly have no other covering than leaves or a little earth, when concealed by mice or squirrels. If sown in autumn, Ash seed should be covered with litter during winter to prevent washing out by rains.

It seems very probable that the seed of the Green Ash is often gathered and sown as that of the White. The Green Ash is common along streams in the West—it produces seed more frequently than the White Ash, and upon small trees—it is, therefore, more easily collected. The seed vegetates with greater certainty than that of the White Ash, even if sown dry; and the young trees grow more rapidly for the first year or two. When in leaf, it may easily be distinguished from the White Ash; the timber is similar in quality, but it has the disadvantage of never becoming a large tree.

The White Ash is somewhat variable in its characteristics, and some of these variations have formerly been named and described by botanists as permanent varieties, or even species. It belongs to northern latitudes, and only obtains its fullest developments in colder climates than that of Northern Illinois. The Blue Ash abounds in more southern latitudes than the White; it is in every respect as valuable, and has the advantage of being more durable. The combination of strength, lightness and elasticity in Ash timber renders it superior to any other native wood for many purposes, and the demand for it must always be extensive.

Much has been said and written in praise of the European Larch, but nevertheless, little if any notice has been taken of its peculiar fitness for

railroad ties. No way of making a railroad track has been found to answer the purpose so well as that of laying the rails upon cross timbers; consequently, while railroads exist the demand for ties must be very great. In Great Britain the Larch is used for this purpose in preference to any other wood. The shape of the tree renders it peculiarly fit for ties—when closely grown, it is tall, straight, destitute of large branches, and tapering very gradually from the base. The wood, beside being very durable, is solid, giving a firm hold to spikes. Another advantage is the much greater quantity of timber which may be obtained from any given number of acres of Larch than of most other trees. If we may believe English writers, ten acres of Larch will afford as great a quantity of ship timber as seventy-five acres of Oak. Larch can be grown more thickly than Oak, and does not divide at the top into large branches; consequently, a greater portion of the tree is available for use. The writer has Larch trees which, being thickly grown, have, in fifteen years, attained the height of fifty feet, with a diameter of from eight to twelve inches. The European Larch should never be planted upon wet land.

The American Larch has been eulogized as fully equal to the European in durability. Michaux describes it as possessing the same properties. In the British provinces, north of the St. Lawrence, and in Newfoundland, where it is highly esteemed, it grows upon uplands, forming large masses of forest. In the United States it is found only in swamps—never on upland—a fact which Michaux regards as evidence that the climate of the northern limits of the United States is too mild for its constitution. From all the testimony the writer has been able to collect from those who have used it, it appears that when grown in swamps, in the United States, it is by no means remarkably durable. Whether this is owing to soil or climate, is a matter of uncertainty. The European Larch is found principally in the central and southern parts of Europe, and is therefore better suited to the climate of Northern Illinois than the American species, which reaches perfection only in a much colder climate, and is, likewise, of slower growth.

It may not be improper here to notice recently published opinions of men of note in regard to one or two subjects which, although not strictly belonging to timber-planting, are often discussed in connection with it:

Mr. Thomas Meehan, in an article published in the New York *Tribune*, and copied into the *Prairie Farmer*, criticises a paper read by Prof. Hough, before the American Association, and takes the ground that trees do not affect climate. He also asserts that the crops with which the farmer covers the soil are a full compensation for the absence of forests as far as the retention of moisture is concerned. In a notice of the report of the Agricultural Department, for 1872, in the *Gardeners' Monthly*, for January, he uses the following language:

"The report of the botanist goes over the various statements made over and over again, on the flimsiest of foundations, that great changes of climate have occurred in various parts of the world by the cutting

away of forests. It is time that sensible men had dropped this nonsense."

Mr. C. V. Riley is reported as having expressed similar opinions at the last meeting of the Illinois State Horticultural Society, and as having made the surprising statement that there is at present more timber in the State of Illinois than there was twenty years ago.

It is not proposed to enter upon an elaborate argument upon these subjects—the limits of this report will not permit—and they may attract more interest in discussion than in a written essay. A few brief suggestions only will be made.

That the climate of many parts of the earth has been unfavorably affected by the total destruction of forests, is an opinion held by men of greater scientific attainments and more extended observation than Mr. Meehan. That he should designate the foundations of this opinion as being of the flimsiest character, savors somewhat of arrogance; particularly, as some of his assertions do not appear to rest upon a very substantial basis. But to the point: Meteorological tables, showing the temperature and the depth of rain-fall, furnish the only recorded means of deciding in regard to a change of climate. Let us suppose a comparison of the records of temperature and moisture of two periods of ten years each. Let us also suppose these periods separated by an interval of fifty years, during which time a tract of country is settled and cleared of forests. The average temperature in the two periods may be nearly the same; there may be little difference in the rain-fall; and yet in the latter period, the atmospheric conditions, the variations of heat and cold, of dryness and moisture, may be so changed by the destruction of the woods, as to affect injuriously the productions of the soil, and lessen the comfort of animal life. Every one knows that a man can endure a much greater degree of cold in the still atmoshpere of a forest, than when exposed to wind on the open prairie. Why may not the same be true of vegetable life? It is not true that the grain and grass with which the farmer covers the land, prevent the evaporation of moisture as effectually as a forest; or even as the growth on unpastured prairies. Much of every farm is closely pastured through the growing season; the removal of small grain and hay leaves the land naked from midsummer onward; the rains run off more quickly than from woodland, and evaporation is more rapid; so that if the rain-fall be not diminished, there is a diminution of its beneficial effects. Peaches were formerly plentifully produced in New England; they can no longer be grown there, and the removal of the forests is believed to be the cause. Mr. Meehan seems inclined to doubt that the drying up or diminution of springs and streams is a consequence of the loss of the forests. What other cause can be assigned? The writer has reason to know that the atmosphere and soil of the State of Illinois have become drier during the forty-three years which he has inhabited it, in consequence of the destruction of the native grasses and other plants which clothed the prairies, and the cultivation of the earth. Many facts might be cited in evidence.

But what shall be said of Mr. Riley's statement, that there is more timber in the State than there was twenty years ago? Verily, if our forests have increased in spite of the wholesale destruction in that period, there is little occasion for troubling ourselves with planting.

ARTHUR BRYANT.

MR. ELLSWORTH—The assertion that we have as much timber growth as we had twenty years ago, is a fallacy; those who make this assertion cannot have made careful observation. The number of acres reported as "woodland" is no criterion from which to judge, as most of this so-called timber land has been robbed of its large and valuable timber, and on a large portion of it only a straggling, bushy growth exists. The amount of artificial forest now growing bears no comparison to the amount of land which has been entirely cleared and devoted to tillage.

Several other members spoke upon this subject, concurring with the views expressed by Messrs. Bryant and Ellsworth.

MR. MCAFEE read the following paper, written by Mr. C. S. Harrison, of Nebraska, as being pertinent to this subject:

"RAIN-FALL ON PRAIRIE AND FOREST.

"Suppose twelve inches of rain falls upon the open country, and the same amount upon a forest, in twenty-four hours. In the former instance, though the ground may have been dry, it is impossible for it to take in this amount; probably not more than six inches, though quite porous.

"Now multiply the area of the watered region by six, and you have a flood of fearful magnitude, especially if the country is rolling.

"Let the same amount fall upon the forest; you watch it as it comes; ten thousand leaves on every tree catch and hold the drops, 'and dallying with them as they pass, let them gently drop down to earth,' and when they strike the ground there are six inches of leaf-mold, and all the ground itself, for a foot in depth, is very porous; this holds it till the ground still below drinks it in. The old, rotten logs are like sponges, and if the ground and mulch cannot hold it all, the roots form dams to obstruct its flow; and though so much rain has fallen, the streams are not much swollen; and now one sees the grand design of this great surface cistern—the forest.

"There is a remarkable prophecy in Isaiah, which seems to have been directed to the great plains: 'I will open rivers in high places, and fountains in the midst of the valleys; I will make the wilderness a pool of water, and dry land springs of water;' and then he adds, as if to mention the cause to produce these results, 'I will plant in the wilderness (desert place) the cedar, the shittim (acacia) tree, and the myrtle, and the oil tree; I will set in the desert the fir tree, the pine and the box tree together.'"

MR. MCAFEE added that the box, no doubt, referred to the Box Elder; and that "the fact that the European Larch is not mentioned should not be laid to heart by our laricious friends, for the Duke of Athol was in the far future, and how could the prophet know of the larch?"

MR. DOUGLAS referred to the article of Mr. Meehan's, respecting the effect of forests upon rain-fall; and while expressing respect for him, and appreciation of his horticultural writings in the main, yet he thought his, Mr. Meehan's, observations upon the subject of that article had been but superficial, and the facts would not sustain the positions taken.

Mr. McAfee also took the same ground as Mr. Douglas, his arguments being much the same as those given at the late meeting of the State Society at Champaign. [See pages 56–60.] He offered the following resolution, moving its adoption by the Society:

Resolved, That the position taken recently by Mr. Meehan, of Pennsylvania, upon the subject of forest influence upon climatology is untenable, and calculated to mislead and discourage the great interests of forestry.

Mr. Douglas supported the resolution, taking ground similar to that taken by Mr. McAfee, Mr. Flagg and others, in the State Society's meeting. He added that the gradual rise in the Great Salt Lake, which has taken place since forests were planted in its vicinity, was not probably owing to increased rain-fall in that region, but to the influence of the forests in arresting evaporation, so that the rain filtered through the soil, and thus increased the annual discharge into the lake.

Mr. Bryant did not claim that the dryer atmosphere of this State, as compared with that of a quarter of a century since, was due to a diminished amount of rain-fall; he explained that the rank vegetation of former years prevented the drying of the soil, rendering evaporation more slow and constant than now. The dews were then abundant; now they are light and inconstant.

Mr. Foster gave some interesting testimony relating to this subject; among which was that of the observations of Judge Whiting, of Western Iowa, which were to the effect that the value of artificial groves as windbreaks is quite important, giving it as his opinion that where one-fourth of the surface is covered with timber, the three-fourths cultivated will produce fully as much as when the whole is under cultivation; this saving he attributes to the diminished force of the winds when forests and fields are interspersed.

Several other gentlemen spoke to the resolution, whose remarks could not be taken by the Secretary.

The ayes and nays being called for on the resolution, it was adopted; forty-six voting aye, and six voting no.

TIMBER AND ORNAMENTAL TREES.

Mr. L. K. Scofield, from the standing committee on Ornamental and Timber Trees, read a report, which he failed to leave with the Secretary for publication.

This paper opened a discussion upon the planting, transplanting and growth of valuable trees for timber.

Mr. Wier recommended the Osage Orange for a timber tree for the southern portion of the district, the timber being as durable, and as valuable for wagon timber, etc., as any other sort.

Mr. Douglas, in answer to a question, said that trees, if exposed to the winds, usually make the most wood on the east side, owing to damage to branches upon the west side by the winds, resulting in a greater development of leaves and branches upon the east side; the greater wood

development being upon the same side as the greater leaf development, and that this accounted for the fact that so many trees have their hearts nearer one side than the other of their trunks.

Mr. Bryant had observed straight trees which, when cut into lumber, or split, showed curved hearts; the straightening, he said, resulted from the effort—and a successful one—of nature to straighten the crooked ways of saplings, by causing a larger deposit of wood upon the concave sides of the bending stems.

Mr. Scofield recommended transplanting young larches early in spring, though he had succeeded well with them when moved a short distance, and without exposure to the roots, after growth had started considerably.

Mr. Galusha, in reply to the question, "How can young plants of larch be best kept over winter, for spring planting?" said that success was almost certain if they were buried, root and branch, in a cool cellar, in such a way that all the roots would be in contact with earth. Care must be taken that the temperature in the cellar is kept near the freezing point, else they will start to grow. If the earth freezes a little no harm will be done.

Mr. Douglas recommended burying them in an out-door root-house, or keeping them in a *cold* cellar. He said that if the plants were taken up in the fall and kept in damp earth, as cool as possible without freezing, they may be kept till late in the spring.

Mr. Edwards, from Committee on Forest and Ornamental Trees, reported as follows:

TIMBER-PLANTING.

BY SAMUEL EDWARDS, BUREAU COUNTY.

So much has been said and written with reference to the rapid destruction of forests available for the use of this section of the country, and the need of immediate extensive planting by prairie farmers generally, that further argument on these points seems superfluous. Those who are not yet convinced, would not be, "though one rose from the dead." It may, however, in this connection, be proper to state that each year's experience serves to confirm the correctness of estimates heretofore made, with reference to the speedy approach to the time when lumber must command a large advance on present prices. Calculations made within the past year, for the State of Michigan, allow but twelve years more for the clearing of her pine forests.

When the people at large fully realize the existing condition of the lumber rescources and demands of our country, then, and not till then, may we hope for a general uprising and entering upon this work. Those soonest convinced, first at work, will be the first to receive the reward.

In this fast age we are too impatient for results, and it is difficult to establish any new industry which does not promise exorbitant profits and speedy returns; so we go plodding along in the "old ruts," raising the old routine of crops, in many times at a positive known loss, for years in

succession, when here is a branch of business which all who investigate are satisfied is to yield certain remunerative profits, not liable, as ordinary products are, to serious depression in prices at times, with no possible danger—as there is in many departments—of over production. Some who have been in the nursery business within the past century may have a realizing sense of the state of things above alluded to, and would fain have some of their acres now growing up to timber—planted in European Larch, rather than grafted Apple trees.

The numerous small beginnings which have been made in planting timber on the prairies are satisfactory (if we except Black Locust and Lombardy Poplar), and are inducing a gradually increasing attention to the subject.

The abundant supply, so cheaply furnished in our markets, serves to satisfy the mass of prairie farmers of our State as an excuse for neglecting to take a part in performing this duty we owe to posterity. Being farther removed from our common source of supply, the States of Iowa, Kansas and Nebraska are setting us a worthy example; their settlers upon the prairie generally engage at once in timber-planting, as extensively as possible. The only instance of planting in Illinois on a large scale, known to me, is the three hundred acre piece of cheap land at Waukegan, the planting of which was commenced last fall by Robert Douglas and sons. This seems like the dawning of a new era for those who have ever felt the importance of immediate general planting. Let us hope that the little we have of waste prairie land will soon be set to timber—the most profitable use to which it can be put.

By a judicious selection of varieties of trees adapted to the soils to be planted, capitalists can realize satisfactory dividends, while operating in the interest of the people.

Let our prairie farmers plant European Larch to meet the prospective demand for railroad ties, and in a few years it will prove to be a movement which will return to them liberally of the gains hoarded by railroad monopolists.

Besides European Larch, the White Pine, Scotch Pine, White Ash, Black Walnut, Butternut and the Oaks, are valuable for growing on dry soils. Swampy lands can be profitably planted to White Willow, Arbor Vitæ, the Spruces, Black Ash and Silver Maple.

In planting for timber always set close, not over four by four feet at farthest, and a less distance in many instances is to be recommended.

White Willow, set two by four feet, would pay all cost; for at the first thinning the one-half cut out can be used for hoops and slats in baling hay. It has proved suitable for use in hooping large boxes of trees from nursery.

It is currently reported in our newspapers that eastern capitalists are buying up Illinois coal lands. Should this prove true, who can predict how long it will be before the price of coal will be doubled, as it has been within a dozen years in Great Britain?

Let us who are deeply impressed with the necessity of immediate extensive plantings, emulate, so far as in our power, the noble example set

by friend Douglas, and each one of us who is settled on the prairie, plant as well as preach—example is an excellent means of enforcing precept.

Some excuse themselves on the plea that there is more timber in our State now than there was thirty years since; others make the excuse that as prairies are naturally void of trees, timber-growing on them will never prove a success. With the first class named I beg respectfully to differ entirely—from observations made in parts of the State with which I am familiar. In many instances we find land on the borders of our native groves growing up to timber, but in passing through most of our timber land we find the monarchs of the forest, which required centuries to produce, largely represented by stumps, the size of which demonstrates that one of these equalled in value many hundreds of the saplings, which, in the eyes of some, are filling the vacant places.

With the examples of successful growing of timber on a small scale all over our prairies, it seems strange to me that there should be a doubting Thomas who has devoted careful attention to this subject.

Mr. Budd said that the Iowa State Horticultural Society had offered two hundred dollars in premiums for trees planted on a fixed day next spring—called "Arbor Day." This list of premiums was read by the Secretary, and favorably commented upon by several members; the speakers all agreeing that it would be wise for legislatures in our own and other Western States to offer premiums, or authorize State Horticultural Societies to do so, for tree-planting each year.

The Society then adjourned until evening.

SECOND DAY.

EVENING SESSION.

The Society reassembled at half past seven o'clock.

The first business of the evening was the reading of the following paper:

MARKETING AND UTILIZING HORTICULTURAL PRODUCTS.

BY M. B. SPAFFORD.

The situations of fruit-growers are so diversified that no general remarks of mine can be of much service.

We need have no fear, for years to come, that good, long-keeping varieties of apples will be unsalable, at good, paying prices. In 1872 we had an abundant supply of apples, but it was only the fall apples that were too abundant; for as soon as cold weather came on, winter fruit

brought one dollar per bushel in our best fruit districts, and no one lost any apples for the want of a market. This teaches the first lesson: that we should increase our cider and vinegar mills, or diminish our supply of fall fruits. This year we have had a short supply or crop of fruit—only about one-quarter as many as last year—and our market has been supplied by importations from east of us, which, after paying freight, have brought fair prices and supplied us at rates but a trifle higher than our own brought a year ago. Our apple crop has sold at too high figures generally, taking cost of production into account, for a permanent market price. Our largest producers generally sell at the best figures; and here cometh the second lesson: that to sell to good advantage we should mass our products and let some man sell the main crop.

The utilizing of winter fruit will, in a great degree, depend upon our facilities for keeping it in good order; the building of fruit houses requires capital, and no plan seems to be perfected yet. If we build cellars above ground, and build a larger building over them to keep sun and storms from them, we may get the two necessary conditions for its keeping well. viz.: an even temperature and a dry atmosphere. A cellar 14 x 16, seven feet high, may be built for fifty to seventy-five dollars, of brick or stone walls; then put joists on and lay a floor over, and cover with dry earth eighteen inches deep, (the dryer the better; this is an essential point). A building put over this to keep sun and storms off, may be of rough, cheap lumber, or may be built ornamental, as may be desired; it may be filled with apples in barrels, and if these are covered with dry straw, hay or corn fodder, four feet thick, the apples will keep as good as in any way they can be kept, until late spring. The cellar will hold one hundred and sixty barrels of apples, and the building above as many more. Our cellars under the house are too warm in the fall, and are too often opened, to keep apples in; and they are filled up with cabbages, turnips, onions and other savory products that often decay there before removing, rendering them perfectly unfit to store apples in. The old method of drying apples is still available, and by a little ingenuity on our part, can be used much more economically than any patent process we have yet seen.

The proprietors of the Alden process have forever debarred the public from receiving any benefit of their patent, by holding it as a monopoly; for the primary object of the patent law is the public good. Fruit from this establishment has been sent out as genuine, to customers, which is but little, if any, better than that dried by the old process. These patent monopolies are what the people have their eye on now, and we can not encourage them in any form.

The process of canning fruits and vegetables of all kinds is so far perfected that it seems to be the most available for family use of any others, and it seems to me that we should encourage its use by all means in our power, as by it we can bring within the reach of all this best of God's gifts to man. Every family should eat fruit at least once a day the year round with their meals, and as the use of fruits increases in the family, the use of hog and hominy decreases, and civilization and refine-

ment step in, and mankind will pass from the cannibal period to that of a more refined and intelligent state of existence.

Fruit should not be considered a luxury only for company. It should be used as food, and children taught to appreciate it as such, so that when they take our places, they will feel the necessity of it and extend its use.

Very large quantities of fruit are annually consumed in jellies, catsups, etc. In our table caster is to be found the grape catsup, which we cannot dispense with; the currant comes next in favor, either of which is highly palatable and much more healthful than such condiments as pepper sauce, Worcestershire sauce and the like, which are no more digestible than sawdust, and not half as harmless.

The manufacture of cider and cider vinegar is not carried on here in the West to the extent it should be, and thousands of bushels of fall apples were lost in 1872 on this account. Probably not one-tenth of our vinegar is made from cider that is called cider vinegar. A very strong prejudice exists in some minds against the use of cider; and I have one man in my mind now who would not have a grape-vine grow on his place, because it might lead to the making of wine, and he might become a drunkard! A few years later that man's orchard got too large for his own use, and he built a cider mill, he said, "to save his poor, wormy fruit;" and he will drink a full goblet of old wine at my house as quick as any one. Query—What shall we do with such men?

The following resolution was read and adopted, viz:

Resolved, That the Committee on Publication be authorized to condense any reports or papers handed them for our published transactions, so far as they deem necessary.

Dr. Wm. Le Baron, State Entomologist, read the following paper:

THE BIRD QUESTION.

In the course of the discussions which have taken place at our horticultural meetings, a number of topics, more or less intimately connected with my own department of practical entomology, have sprung up, and have elicited a good deal of interest, but have generally been very partially and imperfectly treated.

One of these subjects is that which is commonly referred to as *the bird question*. It has appeared to me that it might be interesting and useful to take a more comprehensive view of this subject than has been ordinarily done, for the purpose of determining what is the true relation which birds bear to horticultural and agricultural interests.

We are liable to form erroneous opinions of things from the imperfection of our knowledge concerning them, and fully as often, perhaps, from taking a partial or one-sided view of them, as they may happen to affect our own personal interests. And so it is with the bird question. One man, with refined tastes and a strong affectional nature, and who, we will suppose, has never been much annoyed by these creatures, regards birds as one of the chief ornaments of his grounds, and one of the delights of his life. If his birds should leave him or be destroyed, he would feel

it as an irreparable loss, an aching void in his natural surroundings. He looks at them from the sentimental or romantic point of view. In his mind they have become indissolubly associated with the varied and pleasing changes of the seasons; they usher in the vernal year; they enliven the summer solstice; and as they flit silently past, in their changed and plain plumage, on their southward migrations, in the fall of the year, they seem to be in perfect harmony with the falling leaf and the sombre tints of autumn.

Another man, not necessarily less refined, perhaps, but who may have a somewhat sharper eye to the utilities than to the amenities of life, and who may have turned his attention to the cultivation of some of those smaller and more delicate fruits which are so very tempting to birds, as well as men, or who may have happened to plant his corn field along side some bushy meadow where blackbirds naturally congregate, finding himself much annoyed, and, it may be, seriously damaged by these creatures, regards them in a very different light. If he ever had any partiality for birds it will be likely to become rapidly dissipated; their charms will be much less apparent. In short, he will regard them as nuisances.

Let us look at this subject a few moments; first, in its general aspects, and then narrow down our inquiry to the practical points at issue. Every one knows, in a general way, that birds are one of the great instrumentalities of nature for keeping in check the various tribes of insects, but no one, who has not examined the subject, is aware of the extent and importance of this agency. Almost all the land birds, except the larger birds of prey, subsist more or less upon insects, and more than half of them live upon insects either chiefly or exclusively. The land birds, with respect to their food, may be divided into three classes, *omnivorous*, the *insectivorous*, and the *granivorous*. The following are the principal omnivorous families: The starlings, the orioles, the black birds, the crows and the jays, the *bomby-cillœ*, or cedar birds, and the titmice. These birds, as a general rule, feed indiscriminately upon berries, seeds and insects.

The principal insectivorous families are the night-hawks, the swallows, the shrikes, the fly-catchers, the *sylviæ*, or warblers, the wrens, the *sialietæ*, or blue birds, the creepers and the woodpeckers.

All these birds live exclusively, or almost exclusively, upon insects. A few of them are sometimes seen to glean a few ripe berries in their season; but these instances are exceptional to their ordinary habits.

The granivorous families are the sparrows or finches, the buntings, the tanagers, the grosbeaks, and the *gallinaceæ*, or birds of the poultry kind, including the various kinds of grouse and partridges. It is a noteworthy fact, however, that a large portion of these birds, which are classified as being pre-eminently granivorous, are also largely insectivorous; and indeed most of them feed their young almost exclusively upon the larvæ of insects.

It is evident, therefore, that in the economy of nature birds are the natural antagonists of insects; and when we consider what wide devastation a single species of insect will sometimes effect, when it multiplies

to excess, we can not doubt that if the agency of birds should cease, every green thing on the face of the earth would be destroyed by the numberless tribes of insects.

This is the general view of the subject ; but when we come to look at the matter more particularly, some striking and exceptional facts present themselves. Though, as we have seen, birds present a sufficient antagonism to insects in the state of nature, they fail to furnish an adequate check to the excessive multiplication of insects which has been induced, in certain cases, by human intervention. The extensive cultivation of certain grains, fruits and vegetables, has been followed by a proportional, and sometimes much more than proportional, increase of some of those species of insects which subsist upon them. But there being no species of birds which are the special antagonists of these particular kinds of insects, there has been no corresponding increase of insectivorous birds. Accordingly, we find that in reducing the numbers of many of those species of insects which are most injurious to the farmer and horticulturist, birds afford so little aid that, in the practical treatment of the subject, they may as well be thrown wholly out of account ; whilst in the case of others, they furnish us with a partial but inadequate assistance. In the last category are to be placed some of the exposed leaf-eating caterpillars, such as the tent caterpillar and the canker worm,which have been known, in particular localities, to have their numbers materially reduced by certain species of birds. But if we take such examples as the chinch bug, the Colorado potato beetle, the plum curculio, the Hessian fly and the bark louse, we shall find that so far from feeding largely upon any of these insects, birds scarcely touch them. The Hessian fly is too small to be sought after by birds as a means of subsistence; although a similar insect, the wheat midge, is stated by Dr. Fitch to be sometimes devoured to a considerable extent, whilst in the larvæ state, by the black-capped yellow bird, or American goldfinch. The bark louse is still more minute, besides being protected by a scale which is scarcely distinguishable from the bark of the tree. The curculio is also probably protected, to a great extent, from destruction by birds, by its resemblance to the small knots and buds on the plum and peach trees. It is true, nature has given to birds very sharp eyes to enable them to detect their insect prey, but it is equally true that she has also endowed insects with the power of mimicry, apparently for the express purpose of protecting them from their feathered enemies. And in point of fact, I believe birds have not been known to frequent, in increased numbers, the plum and peach orchards of the South, for the purpose of feeding upon the curculios with which they are so abundantly infested. Myriads of borers are undoubtedly destroyed by woodpeckers, especially those which live under the bark, or in rotten wood ; but the worst of them, like the round-headed borer of the apple tree, penetrate so deeply into the solid wood, at least in the later stages of their existence, that even the woodpeckers cannot reach them. With respect to the chinch bug and the Colorado beetle, they seem to be absolutely repugnant to all kinds of birds, with perhaps a few occasional exceptions, which, however, are not very well authenticated.

It would be interesting, did time permit, to compare with the inefficacy of birds in combatting some of the more prolific and injurious species of insects, the extensive destruction of many of these species by the natural enemies in their own class, and especially by the parasitic insects. These creatures are so minute that to all ordinary observation they may be said to be invisible, and therefore their agency is almost unknown, except to professed entomologists, and even they have probably as yet formed no adequate conception of the extent of their operations. But there are many cases on record where some destructive insect has suddenly disappeared without obvious cause, and upon examination every remnant of them is found to be infested by one or more of these internal parasites. But these, also, have their preferences in the selection of their foster-parents, and seem to be especially addicted to the larvæ of the Lepidoptera. Striking instances have been known of the wholesale destruction of the army worm, the tent caterpillar of the forest, and the larvæ of the tussock moth in this manner. But there are some of our most destructive insects, of which the chinch bug is a notorious example, which are almost completely exempt from damage by natural enemies of any kind, and the only sure remedy which is sometimes left to us in such cases is the final one of abandoning for a time the crops upon which they chiefly subsist.

Here, too, would be the proper place to introduce a consideration of a question which has been sometimes raised, whether birds may not do a great deal of harm by destroying indiscriminately the beneficial insects, both predaceous and parasitic. The argument is this: that many of the insects destroyed by birds are infested by internal parasites, often many in number, each one of which, when arrived at maturity, would be instrumental in destroying many more, and therefore that in devouring these infested individuals, birds destroy many more of our friends than of our enemies. This, like many other plausible arguments, shows its own fallacy by proving too much. If birds do more harm than good by destroying parasitized insects, then so do we, and we should abstain from killing all kinds of noxious insects for the same reason. This position assumes that the class of insects contains within itself a sufficient system of checks and balances to keep its species within proper bounds; and if the argument be made of general application, it excludes the whole series of insectivorous birds from any normal or useful part in the economy of nature.

It would also be an interesting inquiry respecting the different classes of agents for keeping insects in check, namely, the insectivorous birds, the predaceous insects, and the parasitic insects, whether they occupy, to any considerable extent, different and distinct fields of operation, and whether, therefore, the work of one class may be said to be the complement of that of the others. That this is true to a certain extent there can be no doubt, but to how great an extent, it would require much time and investigation to determine. The following statements may help to elucidate the subject.

Birds seem to be the natural antagonists of such insects as are exposed to view, or which are but slightly concealed, whilst those which are deeply hidden in the trunks of trees, in fruits, in the earth, or in the water, for the most part escape them. But it is important to bear in mind that what may be called exposed insects, embraces not only the superficial larvæ, such as the leaf-eating and the leaf-rolling caterpillars, but it includes almost all kinds of insects in their perfect or winged state. The crops of small birds are often found to contain fragments of the hard wing covers and legs of beetles. Those birds which spend most of their time on the wing, like the night-hawks, must depend almost wholly upon winged insects for subsistence. Swallows are often seen skimming over the surface of ponds in search for the newly emerged aquatic Neuroptera. And the fly-catchers capture most of their prey upon the wing. On the contrary, we know that insects in their perfect or imago state are rarely attacked by either predaceous or parasitic insects. They are either too hard to be injured by them, or too active to be caught by them. It is therefore in their larva state that insects are so extensively destroyed by the predaceous and parasitic species of their own class. But like all general rules this has its exceptions. A few of the larger and more active carnivorous insects, such as the dragon-flies, capture their prey on the wing, in a manner very similar to that of the fly-catching birds. A few cases, also, are on record of the parasitic ichneumon-flies being known to emerge from the bodies of mature beetles. (Westwood, II, pp. 142–3.) But these instances are so rare that it is reasonable to suppose that the parasites did not attack the adult insects, but that they deposited their eggs in the bodies of their larvæ, but at so late a period that they did not come to maturity till after their foster-parents had passed through their transformations.

But this exemption of imagos from parasites does not seem to include those outside of the hymenopterous order. The larvæ of the parasitic beetles, (*Meloe*, *Sitaris*, *Ripiphorus*, and *Stylops*,) are found in the bodies of adult bees and wasps; and many of the two-winged Tachinæ are known to deposit their eggs upon the bodies of beetles. Many persons are familiar with the eggs of these flies on the backs of potato beetles.

Mr. Geo. M. Dodge, of Bureau county, wrote to me in 1872: "More than half of the Colorado potato beetles that I have found on our potatoes this fall have had the eggs of some kind of Tachina on their wing covers, sometimes as many as seven or eight on one beetle." Mr. Dodge also found similar eggs on the *Lytta marginata*, one of the blistering beetles which are injurious to potatoes. A European author, Leon Dufour, has described a species of Tachina which he reared from the larva state, and which he found in one of the Tortoise beetles; and another which he reared from one of the bugs proper, *Pentatoma grisea*. And Dr. Shimer, of Mount Carroll, has obtained a small species of the same family from the striped cucumber beetle, *Diabrotica vittata*. But these coleopterous and dipterous parasites, though considerably numerous in the aggregate, are relatively small in numbers when compared with the almost countless hosts of hymenopterous parasites, the Ichneumonidæ, the Chalcididæ, and

the Proctotrupidæ; and from these we have reason to believe that insects in their imago state are for the most part exempt. On the other hand, the subterranean larvæ which, in a great measure, are out of the reach of birds, are extensively preyed upon by the numerous kinds of ground beetles and their larvæ, which occupy the same territory with themselves.

But the prosecution of this department would carry us too far from our main topic, and we pass on, therefore, to consider another branch of the subject.

We have stated above that the extensive cultivation of certain fruits and grains has been followed by a very natural consequence, but one which no one probably foresaw, namely, the more than co-extensive increase of some of those species of insects which naturally feed upon them. To such an excess has this multiplication of certain kinds of insects gone, that the production of some of our most valuable crops has been rendered, in some seasons and localities, either a partial or a total failure.

In treating of birds the interesting question arises whether there have been any similar instances of the excessive increase of the granivorous and frugivorous birds. The consideration of this question will bring us directly to the subject of the most immediate practical importance, whether any species of birds are actually found to be so numerous, or so injurious, as to require their destruction, and whether such destruction is, upon the whole, advisable.

Some birds, like some insects, are remarkably prolific, though why they should be more so than other species, closely related to them, it is impossible for us to tell. There are insects so nearly allied to the potato beetle, and to the chinch bug, that it requires pretty close observation to tell them apart, and yet they are only known as comparatively rare insects. So the wild pigeons sometimes congregate so as to break down the branches of forest trees by their weight; whilst the nearly-related ground-dove is only seen in pairs, here and there, gleaning their subsistence by the road-side. The black birds and rice buntings are also often seen in very large flocks; but the corn and rice crops upon which they depredate are so abundant, that these birds do not make any very serious impression upon them. How trifling is the amount of damage caused by these most prolific of birds, when compared with that effected by some of the more destructive species of noxious insects. Two obvious reasons occur to us why birds do not go on, like insects, increasing almost indefinitely: First, that birds rarely lay more than four or five eggs, whilst insects often lay four or five hundred; and secondly, insects lie dormant through the winter months, and require no food, whilst birds have to migrate to different localities, and run all the risks of an insufficient supply of food, when removed from the abundant harvests among which they have been reared.

But it is more particularly the fruit-eating birds which have excited the apprehensions of the horticulturists, especially those which feed upon the smaller and more delicate fruits, such as cherries, grapes, and the several kinds of berries; a class of fruits which are not usually raised in

so great abundance but that the depredations of birds upon them are readily noticed, and sometimes seriously felt.

The number of species of birds thus annoying to the horticulturist is fortunately very small. The only ones, I believe, which require to be specified are the Baltimore oriole, the cat bird, the cherry bird, or cedar bird, and the robin; including, also, in a lesser degree, the blue jay, and the brown thrush; and if we take into account those which damage the field crops, we must include the crow and the black birds.

To these must be added another species of unenviable reputation, but which does not come into either the grain-eating or the fruit-eating class; I refer to the yellow-bellied woodpecker, commonly known as the sap-sucker. The food of this bird is usually the tender inner bark and cambium of trees, but it also occasionally eats insects. Dr. P. R. Hoy, of Racine, who read an interesting paper upon this bird at the annual meeting of the State Horticultural Society, at Chicago, in December, 1861, stated that he had opened many of these birds, and whilst he generally found their stomachs more or less filled with cambium, he also found a few small beetles; and an acquaintance of mine, who dissected one of these birds in the spring of 1873, found a solitary ant in its crop. As the woody substance upon which these birds feed must be much more tender and available at some seasons of the year than at others, it is very probable that if we could follow the course of these birds through the whole year, we we would find that at some seasons insects constitute a considerable part of their fare.

How far the punctures of these birds injure the trees is yet a disputed question. It seems to be the general impression that they are seriously detrimental, and Dr. Hoy confirms this opinion. On the contrary, Alexander Wilson, the ornithologist, records that he examined many trees, for the purpose of determining this point, and though many of them were abundantly punctured, he could not percieve that any of them were injured, and some of them appeared to be remarkably flourishing. And I have myself seen apple trees riddled all over with the holes made by these birds, and yet full of luxuriant foliage. It seems to me, therefore, pretty well established that they do not ordinarily injure trees in this way to any appreciable extent, though it is possible they may sometimes do so in extreme or peculiar cases. There is one way, however, in which they sometimes effect a very serious damage, and that is by girdling and killing the leading shoot of ornamental trees, especially the evergreens, and thus preventing their symmetrical development. But whatever may be the amount of injury committed by these birds, they must be dealt with upon the same general principles which govern the treatment of other injurious species, and to which we shall refer in the sequel.

The list of objectionable birds, small as it is, may properly be divided into two classes: those which are only annoying or troublesome, and those which are seriously injurious. The latter class embraces pre-eminently the first two birds on the list, the Baltimore oriole, or golden robin, and the cat bird; and these two birds are thus signalized, not so much for what they devour, as for their pernicious habit of pecking into

and spoiling a great deal more fruit than they require for food; a practice which we have had occasion to notice but little, here at the North, but which is said to be a cause of serious damage in the fruit regions farther south.

With respect to the first class, or those which are merely annoying, or slightly injurious, the shooting or otherwise destroying them can not be justly regarded as otherwise than wanton cruelty. Their beauty, their songs, the animation they give to the landscape, the general harmlessness of their characters, and, finally, their undoubted usefulness during the greater part of the year, ought to ensure them from harm.

But what course shall we take with regard to those birds which, either from their numbers or their peculiar propensities, are seriously detrimental to our interests? Supposing that it has been found, or that it may hereafter be found, that, owing the depredations of certain birds, it is impossible to raise some one or more of our standard fruits, or other crops; there can be no doubt that the species of birds causing this damage would have to be placed in the same category with noxious insects. It would be true of both, that, though useful in the general economy of nature, their injuriousness had come to surpass their usefulness, and their numbers might, therefore, require to be diminished. But there are some ardent admirers of birds who can not bring themselves to admit that, in any case which will be likely to arise, it will become either desirable or safe to destroy any cousiderable number of their favorites; and they cite, in corroboration of their position, those cases which are on record in some of the European countries where, at certain times, the practice of killing small birds has extensively prevailed; and where, in consequence, the country has been overrun by destructive insects, and to such an extent that the national authorities have been compelled to interfere, and not only forbid the killing of small birds, under severe penalties, but have, in some instances, taken measures to re-introduce them from neighboring countries.

Such historical facts as these furnish an admirable proof of the general utility of birds, and of the folly, as well as the cruelty, of their indiscriminate destruction; but they constitute no argument against the occasional diminution of particular species, should this become necessary. The killing of small birds in some parts of Europe, especially Germany and Italy, has been done by the poorer class of peasantry, for the purpose of supplying their families with a small pittance of animal food, which they were unable otherwise to procure, and the destruction of birds by them has, therefore, been general and indiscriminate; whereas, in abating the damage done by birds to the farmer or the horticulturist, it is not expected to be necessary to wage warfare upon but a few species, and that these will require to be diminished only, and not exterminated.

It must be a source of gratification to the lovers of birds, and this embraces all of us in a greater or less degree, that the number which it is supposed it may become necessary to reduce is so small, being limited to less than half a dozen species; and I do not wish to be understood as advocating the destruction even of these. My object is to present some

of the leading facts and considerations which should govern our conduct in this matter, and with these general principles in our minds, I believe it will be safe to leave the bird question to the good judgment and good feeling of those who are more especially interested in it.

MR. WIER—The sap-sucker is not a true woodpecker. The hairy woodpecker is the only practical enemy to the round-headed apple tree borer, and is therefore one of the most useful of birds, while the sap-sucker, which so nearly resembles it, is one of our enemies.

MR. POWELL said he had some Scotch pines which were badly injured by the sap-suckers, but had stopped their work by wrapping cloths around the bodies of trees where they worked; also had frightened them away by hanging white cloths in the evergreens.

MR. GALUSHA described the sap-sucker as a brown bird, about half the size of the robin or the common red-headed woodpecker, with a yellow breast, the males having a small tuft of red on top of the head. This bird is quiet in its work, seldom making a noise except a single chirp when it flits away from the tree, where it has been filling its craw with sweet juices of the pine. He said it is not an insectivorous bird, as its tongue is not barbed like that of proper woodpeckers. He regarded it as a great nuisance among a plantation of Austrian and Scotch pines, though it seldom did serious damage to deciduous trees. The work done in spring, before its molting season, and while the sap of the trees is in vigorous circulation, does not seem to kill the trees; but that done later, when the parent birds return from the forest, and bring their whole family with them, proves most serious, and often fatal. He had known many fine Austrian pines utterly ruined by these little girdlers. The plan for capturing them was described as follows: "Take a shot-gun loaded with fine shot, and station yourself, early in the morning—say about sunrise—near the tree which the birds have lately worked upon, and in plain sight of the little rings of fresh holes in the bark, and you will not have to wait long before this pretty little thief will come for its breakfast, as it eats from the dish made but a day or two previously, and usually digs out new cups for future use before leaving, unless stopped by the small shot aforesaid." He had saved the lives of several valuable Austrian pines in this way, with the loss of but a few birds and a very small amount of ammunition.

DR. LEBARON, in answer to a question, said that the oyster-shell bark louse has been for several years extensively preyed upon by acari, which devour the eggs under scales, and by the lady bugs, and a chalcis fly discovered by himself, which destroy the eggs. He thinks there is no reason to fear serious damage to fruit trees from this louse, on account of the prevalence of its enemies. He had colonized the chalcis fly in infested apple trees with excellent success. He was also asked for a remedy for the small brown-headed strawberry worm, which is destroying the foliage of so many strawberry plantations; to which he replied that undoubtedly scattering air-slaked lime, sprinkling a solution of Paris green upon the infested vines, would check the ravages of the insects; but as they work

while the berries are on the vines, such applications are not advisable.

Mr. Galusha said that he had been troubled by this insect for several years, but that it was not as bad last year as before. They had not seriously affected his vines in any season until after the main crop had been gathered; and he thought the remedies mentioned by Dr. LeBaron could be applied at a time when the insects were still prevalent, and not sacrifice more than a quarter of the crop. He suspected, however, that there was a parasitic enemy at work at this pest, and would endeavor to ascertain the facts during the coming summer. The worm was described as five-eighths of an inch long, white, with a reddish-brown head; it rolls the leaf about it, forming a loose, roomy inclosure.

Mr. Lukins had had considerable sad experience with this worm; it works while the strawberries are ripening, and therefore Paris green solution could not be applied. He had noticed no diminution of its ravages.

The Secretary read the following paper:

THE HONEY LOCUST—(*GLEDITSCHIA TRIACANTHUS.*)

BY EDWARD H. BEEBE, GENEVA, KANE CO., ILL.

All the facts in regard to the growth and habit of this beautiful forest tree—a native of our State—seem to be as yet undetermined. Last spring the question was discussed in the *Prairie Farmer*, "Does Honey Locust Sprout?" Mr. Budd, of Iowa, stated that it did not sprout. "A Subscriber," writing from Edwardsville, Ill., states that it "does throw up veritable sprouts." Here are two direct contradictory statements. May not both be true? And that the difference in the habit of the tree is due to a difference in the locality and soil. "Subscriber" says, "My experience with the timber is from observation. I have some posts now that have rotted off inside of four years. I have seen Honey Locust posts sound and fresh after being in the ground over ten years, and have no doubt that they must have lasted in many instances from twenty even to twenty-five years. My observation teaches me that Honey Locust, to be valuable for fence posts, should be grown upon high, dry clay land, and that those grown upon wet soils will not last long enough to pay for setting the posts." If these statements are true, we see that the durability of the timber is affected by the soil upon which it is grown. May not its tendency to sprout in some localities, be due to the same cause? Eighteen months ago, I purchased my present residence, in the village of Geneva, in Kane Co., Ill. The lot contains over two acres. I found growing upon it fifteen Honey Locust trees, most of them having been planted thirty-five years ago. Making inquiries of previous occupants and neighbors, I was informed that the trees had never been known to throw up sprouts. In Oct. 1872, we cut down five of the trees. Two of them, seventeen inches in diameter, were cut two feet above the surface; the other three were cut at the surface. From none of the trees thus cut down have sprouts started; the soil is dry. There are some other facts in regard to this tree

that I do not find in the botanical books. It is dioecious—that is, having the male and female blossoms on different trees. Prof. Asa Gray says of Gleditschia: "Flowers polygamous."—We do not question the *fact*, if applied to varieties other than G. Triacanthus—Honey Locust. There are ten trees of this variety on my grounds. All of them have flowers, but four only produce seed. Most of them are thornless, as you may see by these twigs taken from them. There is but one tree on the place that has thorns. The Honey Locust is never materially injured by insects. The locust borer (*Clytus robiniæ*)—so fatal to the Black Locust—does not attack the Honey Locust. A brown beetle (*Lytta cineria*) feeds upon the leaves to a very limited extent, preferring the young and tender leaves. Last spring, some six hundred to eight hundred plants, from three to five inches in height, had come up from seed deposited in a corner of my garden. Observing, one day, that these young plants were covered with insects that were greedily devouring the leaves and young shoots, I called upon my neighbor, Dr. LeBaron, State Entomologist, to give me an introduction to my visitors. He did so, under the name of *Lytta cineria*. Thinking their room preferable to their company, I dissolved a table-spoonful of Paris green in a gallon of water, and gave the bugs and plants a sprinkling. The Cineria left instanter. Visiting the plants a few days afterwards, to see if my visitors had returned, I could not find a solitary bug. The remedy proved to be a most effectual one; it had driven off all the bugs, and *killed all the plants*. We have no knowledge of the value of this tree for posts and timber, other than that stated by "A Subscriber." As a shade tree, we consider it among the best. It has a large, dense head, is not easily broken by storms, and is free from injury by insects. The tree is attracting some attention as a hedge plant, as the following will show:

Honey Locust Hedges.—Mr. Joseph Hoopes, one of the best pomologists of Pennsylvania, writes to the New York *Tribune* in relation to the Honey Locust as a hedge plant:

"The Honey Locust differs from the Osage Orange, it being a stouter and less branching hedge plant; therefore to insure a perfectly formed, and, what is of the greatest importance, an impervious barrier, trim severely while young and secure a thick growth at the bottom; or, as some of the growers insist upon doing, allow the young plants to grow at will for a year or two, and then cut down to the ground, thus obtaining a stronger growth. Knowing so well the benefits of the old system, so long tested and proven satisfactory, I prefer to abide by it for the present. This branching from the ground is the most desirable feature in the work—in fact it is indispensable."

A second part of this paper treated of the Black Locust, giving a history of its destruction in the State by the locust borer, (*Clytus robiniæ*). He quotes from Dr. Walsh to show that there is no danger that this borer will attack our fruit trees; and from Asa Fitch, of New York, that this is a native American insect, and having been so long known here it cannot be considered safe to plant seeds of this variety; as the insect, now prevalent over almost the entire United States, attacks the

trees when one and half to two inches in diameter, never failing to accomplish their ruin.

Mr. Hausen has Honey Locust posts, set in 1851, which are sound yet.

Mr. Cotta planted Honey Locust seeds three years ago, and last winter killed most of the plants; the *Lytta cinerea* had worked upon them to some extent. He obtained his plants in Lyons, Iowa.

Mr. Budd said there are two varieties of Honey Locust; the kind indigenous to our latitude is hardy; he has a hedge of this variety which has been turned out, and is impregnable.

Mr. McAfee described a true thorn as an altered branch, coming out just above a leaf, but said the large thorns on the bodies and large branches of Honey Locust trees were not of this class, but came from old leaf scars.

Mr. Budd could produce these thorns on smooth bodies by shortening in the branches. He knew an old hedge of Honey Locust, which had been cultivated on one side but had never sprouted.

Adjourned.

THIRD DAY.

MORNING SESSION.

The Society convened at the usual hour.

Prayer was offered by Rev. Mr. Clark.

DISCUSSION UPON GRAPES.

By vote the subject of the Culture and Uses of Grapes was taken up.

Mr. Kinney recommended grapes for sweet pickles, and when asked if he considered them medicinal, replied that he took very little medicine but a great many grapes, and is very well preserved.

Mr. McWhorter presented the following plan for canning grapes: Clip the berries from the stems, and handle without bruising them, put in cans, set in a boiler of water, fill up the cans with cold water, and heat until the fruit is pretty well heated through; then having hot syrup ready, rich enough to sweeten the fruit sufficiently, pour it in and seal the cans.

Mr. Cewe contended that it was unsafe to cover grape vines with hay or corn stalks, as recommended in Mr. Galusha's essay, as these

would make harbors for mice, which would girdle the vines. He covers his vines by laying them down along the rows, and plowing furrows of earth over them. In spring he uncovers by plowing from the vines until reaching the vines; then finishes the work by lifting out by hand.

Mr. Galusha replied that he had found covering with earth fatal in several instances; one of which was at a time when frost was very deep—the sub-soil being frozen solid—and the surface soil above and around the covered vines, thawed out, was saturated with water, and repeated freezings and thawings in this state killed the buds—drowned them out. This was on a soil well underdrained, but at the time the surplus surface water could not reach the drains.

He would not recommend covering vines sufficiently to make a harbor for mice, as a slight sprinkling of loose material was sufficient; and, as he had said in the essay, it did not seem necessary to give Concords and Clintons any covering at all; yet it is a good plan to cut them loose and let them lie upon the ground over winter.

Mr. Kinney said that prior to three years ago he covered his vines with earth, and lost more than he had since he had left them uncovered. He recommends pruning in spring, just after the buds have opened, as he then knows just what to cut off and what to leave for fruiting.

Mr. Wier said Catawba grapes had been successfully grown in his vicinity, for many years, by covering the vines—they could not be grown there without protection. Severe pruning in the fall weakens the vitality of trees or vines, and should be avoided; would prune in spring after the leaves start, and would never cover Concord vines.

Mr. Cewe thinks the surface roots of the grape are of not much value. He plants his vines about sixteen to eighteen inches deep—having mellowed the soil to that depth—inclining the vines towards the trellises when planted, so they will not be broken in laying down for covering in the fall.

A member recommended keeping clusters of grapes by packing down in pulverized sugar, using sufficient sugar that the layers may not come in contact with each other.

The President said there was another paper upon the grape which the Secretary would read; after which the discussion could be resumed.

The Secretary, Mr. McAfee, then read as follows:

THE GRAPE, AND MY EXPERIENCE WITH IT.

BY D. J. PIPER, FORESTON, OGLE CO., ILL.

In the fall of 1865, I purchased one thousand grape vines of the following varieties: Five hundred Concord, one hundred Hartford Prolific, two hundred Delaware, one hundred Diana, and a few each of Iona, Israella, Adirondac, Cuyahoga, Norton's Virginia, Taylor's Bullet, and Connecticut Seedling, and also set some Clintons of my own raising. I took

great care to prepare the ground, by enriching it with compost from my barn-yard, and plowed the ground eighteen or twenty inches deep; but did not plant my vines until the next spring, when I stirred the ground again, making ridges where I set the vines. Then I staked all my ground off, six by ten feet. I got all the information that I could as to depth of planting, by reading and inquiry, which was but little. I went to work and set my vines from six to eight inches in depth. They all started and grew very thrifty that summer. Then in October, after frost had killed the leaves, I cut them within six to twelve inches of the ground, and covered them with two or three inches of dirt for winter protection. In the spring, I lifted them very carefully; then took my plow and plowed the dirt up to the vines, burying them nearly under. When growing season came on they started and grew about ten inches, then stopped, except one row about sixteen feet north of my garden fence—running east and west, where the snow had lain all winter. These grew right along. Then comes up the cry, "What is wrong with nearly all our vines?" On examining the roots, I found all of the last year's roots frozen dead, and young roots just beginning to start on the vines where they had been plowed under. About the middle of July or first of August they started again, and grew about like cuttings that had been set in the spring. The following winter they shared nearly the same fate; the next summer they grew but very little; then in the fall I dug up about four hundred and put them in my cellar. In the spring following I plowed trenches fifteen to eighteen inches deep, set the vines in them and plowed the dirt up to the vines again. Since then I have not given the Concord any winter protection, although I lost about twenty last winter; but I think they bore too much in 1872, as they bore very heavy, some yielding as much as fifty pounds to the vine. Those that I did not dig up, I covered well; some with old straw and some with dry wheat chaff, which is about the best protection that I ever used, except dry leaves, which, I think, is better. I left the mulch on the ground and plowed right through it with my plow, but did not plow it under.

I find the shovel plow about the best implement to cultivate my vines with, using the hoe under the trellis. In 1872, my Delawares set so much fruit that the trellis was completely covered with it, and they appeared to be doing very well until the fruit commenced to color, when wet weather set in, and it rained very heavy every few days for nearly three weeks. In that time the leaves nearly all dropped off, and the fruit did not ripen any more, but finally dropped. One day some gentlemen and ladies visited my vineyard, and in walking through it on coming to the Delaware, one of the gentlemen proposed examining the roots; and on examination we found an insect in the fibrous roots something similar to those found in the Clinton leaves, and every fibre was dead. Before examining the roots, I thought it was the wet weather that caused the leaves to drop, but that entirely changed my idea about it. I lost over two hundred Delaware vines, with all their great loads of fruit. I set some new varieties in the spring of 1872; some Croton, some Walter, and five of Arnold's varieties; they all froze dead except one of Arnold's

varieties. My Hartfords, Dianas and Isabellas, all froze to the ground. Cuyahogas, Northern Muscadines, and Rebeccas all froze dead, root and branch; while my Concords, that stood along side of them, were not hurt, but bore very heavy the past season, some vines carrying as much as forty or fifty pounds to the vine. One-half of my vineyard lies directly to the west, and the other half directly to the southeast, without any wind-break or protection whatever. The vines in the west half of my vineyard did not set so much fruit, the past season, as those in the southeast did, but it ripened nearly one week sooner, which it frequently does. The soil is what we call good, dry prairie, inclined twenty-five or thirty degrees. I find by having a heavy foliage on the top rail or wire that I get better fruit, and it ripens much earlier, but at the same time I want a free circulation of air underneath my fruit. I have had fruit exposed to the dew and sun that did not ripen before frost, while that which hung mostly in the shade ripened up well. I would rather not have the sun shine on my fruit from ten o'clock until two, as I find that I get much better fruit by having it shaded about noon time. My plan is now to set all vines eighteen or twenty inches deep, and cover the Concords for two or three winters, and after that let them stay on the trellis or stakes without any winter protection; and prune all tender varieties early in the season, and cover them well for winter.

DISCUSSION ON GRAPE CULTURE RESUMED.

Mr. Budd wished to speak of his experience in grape culture. He commenced planting vines shallow, according to the books, but had given that up years ago. He now plants in mellow earth, fifteen to twenty inches deep. With shallow planting he lost some vines, but with deep planting, none. He does not cover his vines in winter—they are Concords.

Mr. Piper asked about the insect which was destroying his Delaware vines.

Mr. Wier replied that it is not an *insect* but a *mite*, as it is not divided into three segments, as are true insects, etc.*

Gen'l Wilson, of Sterling, said he would like to show that he didn't know any thing about raising grapes. He was sixty years old when he left the army; and in 1867 planted 5,000 Concord vines, on a level, rather low, piece of ground. In 1869 it was flooded with water, but had been afterward surface-drained. He at first covered his vines with earth, but discontinued the practice after a few trials, and would not now have Concords covered. He had to unlearn all that he had learned from books on grape culture. Two years since, he went to Nauvoo, and there learned that it is as easy to make wine as it is to make cider. He prunes just as the growth is starting in spring—about the middle of April, in this latitude, and his vines do not bleed.

The President stated that inasmuch as a paper had been read before the Society which reflected somewhat upon a gentleman then present, he

* For full descriptions and illustrations of these insects, see pages 178–181 of this volume.—Ed.

would now give that gentleman a few moments' time, if he wished to speak; whereupon,

Mr. Schuyler said that the objections brought against the Alden Process of drying fruits, in the paper referred to, was no longer an objection, since the company owning the right had abandoned the practice of heating by steam, as too expensive, and were now heating by furnaces, and had so far reduced the expense of fixtures that they were offering to sell heaters and other apparatus for drying seventy-five to one hundred bushels of fruit in a day, including the right to use the same, for $1,000. This, of course, did not include rooms, brick work, etc. He also stated that fruit was often put upon the market as Alden fruit, which was not dried by their process, and that the fruit exhibited by Mr. Spafford was of this character.

Mr. E. Y. Teas, of Indiana, upon request of the President, read a paper upon the European Larch, as follows:

SOME POINTS OF EXCELLENCE POSSESSED BY THE EUROPEAN LARCH.

During the discussion on "Timber Culture" at this winter meeting, some ideas have occurred to me that I feel willing to offer. It is, perhaps, unfortunate that men of little brain get hold of an idea, and having capacity for no other, pursue that one to the bitter end. Yet men of one idea do sometimes move the world out of the old ruts into broader and better paths.

It is unfortunate, and detrimental to the immediate and general introduction of the Larch to its rightful and proper position as a timber tree in our country, that claims have been made for it that are apparently untenable, or at least unwise, and unnecessary to establish its surpassing value and excellence as a timber tree. We do not believe it was intended by our Heavenly Father to unite all the desirable qualities and possible excellencies of timber, for all the varied needs and uses of man, in one single tree; but that many species possess undoubted excellence in various respects. While we believe the European Larch possesses definite, decided good qualities, in some respects superior to almost any other kind of timber, these merits do not exclude *many* other trees from positions of great value in timber culture. It was unfortunate for the Larch that, in consideration of its great success in some parts of Europe, in certain and peculiar situations, the same tree should be claimed to be equally well adapted for all situations and all climates in our country, while we scarcely possess a township of land, in our whole domain, similar to that on which the peculiar virtues of the Larch were first manifested in Europe. The old Duke of Athol, who first conceived the idea of Larch culture in Britain, was not at first sanguine of success, but, with Scotch shrewdness, at first planted only a few trees by way of experiment; and these he located not on his rough, highland cliffs, that he most desired to cover with forest growth, but in the rich, level land, where they could receive constant attention and care.

These succeeded so well that other plantings were made at higher and still higher elevations, with uniform and unvarying success; until during the lifetime of the Duke who began the experiment, many millions of Larches were growing and flourishing on his estates near Dunkeld. When I visited these plantations in the summer of 1867, I found Larches on the high, rocky lands in this picturesque region, flourishing thriftily beside oaks planted at the same time—the latter being less than one-tenth the size of the Larches, and compared with them, quite useless for timber. The Larch is found to flourish at a greater elevation and on thinner soil than any other timber tree; the leaves, dropping annually, enrich the soil more rapidly than the foliage of any other tree, and the timber is more valuable in the market than any other products of such soils.

My inquiries, which were not as thorough as I now wish they had been, lead me to the belief that the Larch attains its most rapid, healthy development, and produces timber of the greatest value on the rough, hilly and rather barren land of the Scotch highlands, and on similar lands in England—about Bristol and elsewhere; that the growth, health, vigor and product are not as satisfactory on the rich and more valuable farming lands of the level districts.

In regard to the durability of Larch wood, it seems to be a well attested and undeniable fact, that in some localities it has proved to be the most durable of any known wood. It is well known, however, that a given kind of tree varies greatly in texture and quality, when grown in different kinds of soil, climate, or under other circumstances affecting the growth of the tree; and it is folly to expect to grow Larch timber on the rich prairie soil of Illinois, similar in texture or value to that grown on the Alps or Scotch highlands. In forest culture, as in agriculture, in our United States, a mixed husbandry will be found most advantageous; each person selecting for his own locality, needs, market or personal taste or preference, such varieties of timber as an intelligent judgment dictates. One thing is evident to every observing, thinking man, and this is that the exigencies of our times demand, more than almost any other one thing, a united, well directed and widespread effort at Timber Culture. In my own State, a few years ago, the great drawback to its settlement and development was the superabundance of timber that interfered with agricultural pursuits. Now, the first and leading question of the seeker after real estate in our section is, "How much timber land have you?" and the price of land depends upon this more than upon the quality of soil or many other important requisites.

This paper introduced again a discussion upon the merits of the European Larch.

Mr. Hill said that some plantations of seedling larches had been destroyed by the white grub, larvæ of the May Beetle. He spoke enthusiastically in praise of this tree, citing an instance in which White Oak timber, subjected to a certain strain, had broken, and upon European Larch timber being substituted and subjected to the same strain, it did not break.

Mr. McAfee then wrote and presented the following paper:

As it has been asserted that European Larch is stronger and tougher than American White Oak, I offer to give $100 to the man who will demonstrate before the next annual meeting of the Northern Illinois Horticultural Society that such is the case, by actual experiment in breaking across sticks of these two woods of one inch square and two feet long, by applying weights.

Any person intending to claim this offer, shall notify the Secretary of this Society, on or before May 1st, 1874; and if any such notice is received, the money will be deposited in bank to order of the Secretary, by June 1st, 1874.

The stick of Larch to be broken to be furnished from any county, by the person intending to claim this offer; and he shall present sworn testimony, fully attested, that it is a stick of the Larix Europa, and I will furnish the White Oak to be broken.

A committee of three are to be chosen, one by the contestor for the premium, and one by myself, and the third by those two, who shall decide whether the premium is fairly won; and if so, shall order the Secretary to pay it over to the winner; and if it is not so won, the Secretary shall pay it back to me.

(Signed,) Henry H. McAfee.

Mr. Spafford stated that posts of the American Larch, set in New York, in 1837, were still standing in 1871. Several other members gave instances in which posts of this tree had proved durable.

ELECTION OF OFFICERS.

The President announced that the time had arrived for the Annual Election of officers of the Society; whereupon, after the appointment of tellers, the election was held, and resulted in the harmonious choice of the following:

President—Tyler McWhorter, of Aledo.

Vice-Presidents—H. C. Graves, L. K. Scofield, Edward H. Beebe, D. F. Kinney.

Corresponding Secretary—D. W. Scott.

Recording Secretaries—Edmund Hathaway, C. W. Richmond.

Treasurer—L. Woodard.

L. K. Scofield presented the following preamble and resolution, moving their adoption:

Whereas, We learn with deep regret the probability that the trustees of the State Industrial University have in contemplation, from a desire to economize in expenditures, to give in the future less prominence to instruction in Horticulture than formerly; therefore,

Resolved, That we firmly, yet respectfully, enter our protest, as of the sovereign people to honored servants, against false economy in this direction, preferring to have expense curtailed in some department of literature, or to have economy equally shared among the different departments.

A rising vote was taken upon the resolution, which resulted in its unanimous adoption.

On motion of Mr. Ellsworth, the time and place of the next annual meeting was referred to the Executive Committee.

Adjourned for dinner.

THIRD DAY.

AFTERNOON SESSION.

The Society was called to order by the President, at half past one o'clock, who requested attention to a paper, to be read by Hon. Suel Foster, of Iowa. Mr. Foster read as follows :

AGRICULTURAL COLLEGES AND EXPERIMENTAL HORTICULTURE.

BY SUEL FOSTER.

I am induced to offer some remarks on this subject because it is so directly connected with Horticulture. Every State, every horticultural society, should have experimental grounds. I was pleased to see, in December last, that your State has made a good beginning in this work at your Industrial University.

In Iowa, our horticultural society appointed a committee to act with the faculty and professor of horticulture and forestry, at our Agricultural College, to institute and continue experiments with fruits, hedges and timber trees.

There is an impression among a great many that agricultural colleges have very generally failed to meet the expectation of our people; and I fear that this is the case to a greater extent than we could wish; but hardly a worse condition than might be expected, under the circumstances.

But what has been the success of our Agricultural Colleges? I will not attempt to enumerate the successes, and the degree of success, for my information is quite limited in this respect. What has been the cause of their want of success? I am aware that I have now introduced a subject quite too broad and intricate to detain this Society in its discussion, but if you have patience for a few minutes, I will very briefly try to point out what I believe to be a very natural way of conducting such an institution, and also what is a very natural way of a poor success with a real Agricultural College.

In the first place I think an Agricultural College should not be connected with the old-fashioned classic colleges and universities. There is an incompatibility—a different class and society with the students of the two institutions—that is hard to overcome. Yes, I may say, is never overcome with many of the students; and if this is true with the students, with how much greater force does it apply to the teachers? Is there not a positive difference between the society of the city and the farmers? This difference of aristocracy is perfectly overcome with many persons, nevertheless it exists, and we must deal with it as it exists. As a modifier of this aristocracy, we can with confidence recommend the Agricultural College education.

To qualify our young men and women for the industrious pursuits, it requires a very different education, *and habits of life—different habits of life; yes, even whilst at Colleges, while at home, while anywhere.*

It may be said that when a student takes his books for study, he should make that his business, his occupation, his chief aim and object. This may be true in some sense, but life is one object greater than education; health is another. Another object is to seek that education which teaches, and most thoroughly impresses upon our young folks, economy of time and industry; to daily do some useful work. We would almost despise a person who would daily take a few paper dimes and consign them to the fire. There might be some amusement in it, and no more expensive than many other amusements. I look upon this exercise for health, in many cases, in the same way; but still the student must have amusement and recreation. Whilst study is the chief object, he must not study too many hours. Eight hours for study, eight for sleep, three for labor, three for recreation, two for miscellaneous, or near that division, is far better than no labor at all.

I would make labor obligatory in an Agricultural College, as peremptorily as I would study, for many reasons: (1) Health, (2) correct education, with a moral principle of doing good, (3) economy, (4) instruction in the work, (5) that we may have educated men for law makers, judges, National and State officers, who are not simply proxy representatives of the laboring classes, but they should positively be of us, that we may actually be present and attend to our own business in the Government. No wonder that we complain that our laws do not suit us! We have not made them; we have not been educated up to making laws, but we are rapidly taking lessons on laws in these later days. The lazy have generally been our law makers, and they were personally interested in making laws for the support and maintenance of the drones. I know of no better way of qualifying our young men for the great reform in lawmaking, which the industrial classes are now demanding, than education in industry—*and an industrious education*—both by the same head and hands. It is far easier to educate our boys and girls to idleness than it is to do work; to do useless things than it is to do useful things. Some intend to go through this world without labor; many are willing to labor for a living, and many make money by laboring and superintending labor. We have many schools where they do not labor, nor teach labor. Let us have one, at least, in each State, where they do. I have hoped that the public would generally be convinced that the principles upon which these institutions are founded *are right*, and that they would succeed until every county in the land would have a high school on a farm. Such is the case in some of the countries in Europe.

No doubt one cause of the failure of Agricultural Colleges has been the want of experienced men for presidents and professors to manage and teach in these institutions. A better day is coming; for young men and women are now annually graduating in these institutions, some of whom, of course, will be better qualified for this duty than those with less experience.

EXPERIMENTAL HORTICULTURE.—In this you will acknowledge that I have touched upon an important subject. When we see how little we know in the various departments of horticulture, and how much there is to be learned, and when we see what slow, awkward and uncertain work in this line we are doing, we naturally look for some concentrated and systematic mode of operation. The Experimental Farm presents itself as the very place, opened with a professor already in that department, ready and anxious to co-operate with the horticulturist, and to inquire what experiments shall first be made. We hardly know what variety of apples to plant, and few will agree, for want of knowledge, and with our varied experience. If we have measured and recorded the product of various trees, few of us have yet a standard of quality; and our markets are less appreciative of quality than we are.

With the hedge, it is generally admitted that the Osage is the plant for the country south of Sterling, and a short distance north of this; but it is very uncertain what to plant further north.

In regard to timber, we are in greater dark. True, it is said that we had *better plant something than nothing*. I will liken this to your Treasurer, who, if he had kept his accounts so that he can not tell which item is debtor and which credit, and is called on to show the balance, he cannot do it. *Better show some balance than none at all.* So we have been working in horticulture. Professor McAfee says the people of Stephenson county have spent at least $40,000 for hedge plants, and much more for labor on them, and yet more in vexation and *humbuggery*, with not a mile of good Osage hedge, but a little Willow, and the best is Lombardy timber wall. Our account with fruit trees is a better success, and a far greater loss for the want of experiment. $100,000 each, in a hundred counties equals $10,000,000, and this is about the sum, probably, that has been expended in this State for unprofitable varieties, for the lack of information which experimental orchards, vineyards, and gardens would give. And now we are recommending nearly every thing that comes along, *for trial.* In this way, what will it cost this State to try the Russian varieties which our Agricultural Department is sending out? We see the necessity of going immediately into this experimental work—one experimenting for all; and although the result will not be correct for all, it will be a guide, to some extent.

Let us come up higher in this experimentation. We have done comparatively nothing in originating new fruits from seed. Here is a nice piece of work that may be done towards perfecting our trees and fruit—propagating from seeds. This will require more time, care, and patience than most of us have to spare; but why not take the apple tree and breed it as the cattle men do cattle? Our apples seem to have all the variation that cattle do, and are as susceptible of change. What is it that causes the apple to be sour or sweet, red or yellow, large or small, of early maturity or long keeping—the tree thrifty or scrubby, healthy or diseased, tender or hardy? Have they inherited these qualities from their ancestors? Or have they not departed from their ancestors—from their good old mother—on a "sport?" If so, let us continue the "sport," and sport

out the evil until all is lovely. What I have said of fruits may be applied to all the branches of our profession. It appears to me that this investigation into vegetable life and beauty should be a paramount business with us to that of geology and astronomy, for it is of more practical use; it comes into our every-day business, and begs for a place at our firesides.

Studies are said to be a discipline of the mind; yet I believe there is none more really good, benign and refining, than the study and care of plants. No schools are so well adapted to teach this as our Agricultural Colleges, yet it should be continued into our common schools. The weightier matters of science should be taught, but the finer qualities of *our* science should no longer be neglected, but progress until our girls can be taught how and where the rose acquires its beauty and fragrance; that they may command the elements in this science, as the telegrapher commands electricity.

Mr. Wier read an essay, as follows:

ENTOMOLOGY—STUDY OF A LEAF.

September 1, 1873.—Passing by a Cottonwood (*P. Manlifera*) today, I observed that its foliage was yellow and falling. Having leisure, I stopped to inquire into the cause of its losing its leaves so early in the season. Plucking a leaf, a glance at its under surface showed it to be covered in patches by a rust-colored fungus, which was in itself a sufficient cause for the destruction of the leaves. But noticing a brighter red speck on the leaf, I brought my pocket magnifier to bear on it, and found it to be a larva or maggot of perhaps a small gnat, feeding upon the fungus. At the same time, I noticed that these specks of fungi radiated from a central point, apparently the puncture of a leaf louse. On a close inspection of the under surface of the leaf, a cluster of *Aphides*, or leaf lice, were found, with their beaks inserted into the cellular portion of the leaf; and although these lice were not small for leaf lice, their color was so peculiar—so near the color of the leaf—that they would not be readily noticed. A careful search among these lice brought to light a maggot, or larva, preying upon them. It, also, was so nearly the color of the under surface of the leaf, and although of considerable size, that it would not have been seen even with the magnifier, had it not, while in focus, captured a louse and reared up, as such larvæ do, while sucking its juices. This was apparently the larvæ of a large gray gnat. Here, then, was a sufficient reason for the early defoliation of the young, thrifty Cottonwood tree, from which the leaf had been plucked; and I thought, of course, that this study was ended.

But as I was casting the leaf aside, the sunlight glimmered from a fine, silken web, near the base of it. Bringing this web into the focus of my glass of highest power, a busy colony of mites (*acari*) were disclosed. (*Acari*, or mites, are for the most part very small animals, many of them not discernible with the naked eye; the ones on this leaf, for instance, showing a mere speck on white paper, and even there would hardly be noticed, except when in motion; they are not true insects, having no

separate, distinct head and abdomen, and, as a rule, have eight legs—the normal number of legs to a true insect being six, yet some true mites have only six legs). They were so small, and so near the color of the leaf, that even with the high power of the glass, they could hardly be seen, except when in motion, yet they produced a more perceptible wound on the leaf than the so very much larger lice; they destroyed entirely the under cuticle of the leaf each way from a central point. These mites feed under an exceeding fine web, spun by them, perhaps, for protection against unwholesome weather and their natural enemies. Though I have been looking up the mite family somewhat for the past four years, these appeared to be a species I had not before observed; I therefore proceeded to give them the closest scrutiny. While doing so, there was a sudden motion, and one of the largest was captured and raised up in air, struggled a moment, and disappeared. At first I could see nothing to produce this effect, but by a little change of light, I made out the outline of a slender, pellucid, worm-like larvæ, flattened out on the leaf. On watching it a few moments, it captured another mite; it appeared to suck the little creature into its capacious maw bodily, not puncturing and sucking out its juices as predaceous larvæ usually do. On examination of other leaves from the same tree, I found colonies of mites on nearly all, and in nearly every one, one or more of their immense (when compared to them) enemies. The little fellows would caper over and around the glutinous creatures until their turn came, when down they would go. A continued search showed this larvæ matured and in its pupa case, the dark outline of the future gnat showing through the transparent case plainly enough for me to determine that a brilliant, jet black, quick-motioned, mere point of a gnat, observed flitting among the leaves, was the parent of the mites' deadly foe. I jot down these notes to call the reader's attention more plainly to cause and effect in the diseases of trees and plants; for instance, after the weather has been dry and hot for a considerable length of time, we see many trees and plants showing sickly, yellow foliage. This is, as a rule, attributed to, by nearly all, the great heat and drought solely. They are certainly the primal causes, for these smaller and more delicate noxious things can only breed fast enough to become noxious during such periods, but the plants would get along well enough if *they* would only let them alone. In this Cottonwood leaf, for instance, the weather being right, the aphides breed exceedingly fast, and puncture the leaves; the weather being favorable, and the *location* of this tree being very suitable, fungi attack these punctures and destroy the vitality of the leaf, and it falls to the ground. The aphides, as well as the fungi, have their enemies at hand; but the conditions are, perhaps, not so favorable for their generation as for the two primaries; and further, aphides, mites and fungi propagate so enormously fast under the most favoring conditions of food and weather, as to be beyond the power of their most potent enemies to check. Yet how nicely all are balanced; strike out of existence a few, only a few, of God's most insignificant creatures, selected from the insignificant gnats, and then let a region be visited with three months of heat and drought and other right conditions, and every, or

almost every, green thing, as well as most other life, would disappear from that region as if by magic.

The foregoing was written early in September last. Continued subsequent observations, on leaf depredators, opened up an immense and little known field of life. I found almost every species and variety of plants having its leaves destroyed or greatly injured by some form of life; the most prominent and destructive of these were *acari;* but fungi, *aphides*, leaf hoppers, bark hoppers, leaf folders, leaf rollers, leaf crumplers, numerous species of Lepidopterous larvæ, or caterpillar, and other vegetable-feeding insects and larvæ, assisted in the general destruction. The result of these observations left it no mystery why our trees could not withstand a severe winter coming after a dry summer. The wonder is how they can withstand any winter at all, be it severe or not.

Leaves are, as is well known, as necessary and vital to plants as lungs are to animals; in fact their functions are greater than the lungs of animals, as they not only vitalize the crude sap or plant food, but elaborate it also; or, in other words, digest it. Weaken the leaves, and the whole structure of the plant is weakened; destroy them, and if the plant cannot replace them, it is dead. Exactly in the same measure as the leaves are injured, so is the whole plant weakened. If I have understood the office of leaves rightly, their manner and times of performing their functions is as follows:

First.—As soon as they reach a certain maturity they elaborate material for cellular, or woody fibre, that builds up the woody portions, as the stems, twigs and bark.

Second.—They elaborate material for the slightly differing cellular tissue, or woody fibre of the roots; and

Third.—Toward the end of summer they elaborate these slightly differing elements that are stored up in the cells of the wood, the roots, the fruits (?) and the seeds, known as plant food, and on which, and the quantity of them stored up, the future vitality and vigor of the tree or seedling depends. According to this theory, if the leaves are weakened, or interrupted early in the season, the tree makes but little growth of wood; if the same thing happens in the last half of summer, the roots are weakened, and there is not a proper amount of plant food stored up in the wood and roots of the tree. The roots may so lack their supply of nourishment as to perish without the intervention of winter. Our grapes refuse to ripen, and other fruits are astringent and unpalatable. In these facts we have a full and true explanation of dead or weakened roots after mild winters, as well as after severe ones; which, experience has proved to me, is often the case.

The question of which are the greatest enemies to leaves, *acari, fungi*, or leaf lice, is a hard one to settle. I am inclined in the belief that leaf lice are; not that their ravages are ever so great as those of the other two sometimes are, but because I am loth to believe that fungi ever attack healthy, living tissue, and from the well known fact that acari seldom, if ever, injure healthy, normal life. The leaf lice first puncture, suck the juices from, disorganize and weaken the leaf; these punctures form *nidi*,

or breeding places for the fungi, and it spreads with great rapidity over whole trees and forest, often taking on a peculiar virulent form, when it appears to destroy perfectly healthy life as well as diseased. The punctures of the leaf lice weaken the leaves, and also in that way make them suitable prey for the mites, which, though delicate and highly organized beings, breed with incredible rapidity, and are more evanescent even than the April snow—swarming one hour, all gone probably the next—a sudden change in the atmosphere destroying every individual, leaving nothing of them behind, except their millions of eggs, which, if the weather becomes again suited for them, at once hatch, and the army of destruction is renewed. The mites, so far as I have observed, gnaw down and feed upon the under cuticle of the leaves, so far as they go, entirely destroying it, stomata and all. They also cover the entire under surface of the leaf with a fine, close web, under which they feed; this also must greatly interfere with the functions of the leaves, by smothering them.

So we see that it is not simply droughts, or severe winters after them, that destroy our trees, though drought, or rather steady dry weather, is the primal cause. A plant that has been preyed upon in its leaves, by these enemies, has about the same chance of wintering safely, as a poor, lousy calf, in the fall has. And what makes the trouble worse, is that we cannot war against these things, to any successful extent; all we can do is to keep up vigorous vitality by cultivation.

I have penned this paper for two reasons: The one the paper explains; the other, to call the attention of our scientific entomologists to these vegetable-feeding mites, a department of their science that has not had near the amount of practical consideration their noxious qualities deserve. D. B. WIER.

LACON, ILL.

MR. MCAFEE to Mr. Wier—Do you regard the dropping of the leaves of the Delaware grape as the result of the work of the *Phylloxera Vastatrix?*

MR. WIER—To a great degree; they and the *acari* weaken the vine. The Concord, however, is almost exempt from the work of the Phylloxera.

MR. ELLSWORTH said that in the early history of the Delaware vine, its vigor was impaired, by propagation, for several generations of the vine, from immature wood; but that in later years, by propagating only from well ripened wood, the vines had improved in hardiness.

DR. L. S. PENNINGTON, from the Committee on Orchard Culture, presented the following report:

ORCHARD CULTURE.

A finely developed tree is a thing of beauty, possessing, in its way, the functions of assimilation and excretion—its winter's sleep and its summer's life—to make which more perfect is and should be our highest aim.

If for fruit, our trees need space, in order to secure air and sunlight; if for beauty as well as fruit, to develop the just symmetry of their forms.

The man that plants cannot realize, when his trees are young, that it will require but few years—say from fifteen to twenty—for them to cover more than their alloted space. The proper distance for planting depends to a very great extent on the kind and character of the tree, to be determined by the judgment of the planter. I have found twenty-four feet as close as a profitable planting could be made. Much valuable time, and many excellent trees, have been lost by a too close planting. In years past, for experiment, I have planted some trees at a distance of sixteen feet, but always at a loss. There is another serious objection to close planting. If crowded when young, you fix a habit that is not easily changed.

A long, slender stem, is a tree of beauty in the forest, but is illy calculated to stand alone to brave the winds and storms, much less to reward the cultivator with its harvest of fruit. We assume, then, that when the proper space and cultivation are given, we shall find the sturdy tree firmly rooted, defying the storms and winds, and giving its fruit in due season. I have said that we need air and sunlight. The sun's rays are as potent for good, in perfecting our fruits and in the destruction of fungoid life, as they are efficient in the home of man, in removing the mildew and foul gases that too often lie concealed in his dark abodes. We too little estimate, I fear, the essential matter and the life-giving power imparted by the sun, for the reason that it seems to us so common. It would appear that the richest portions of our fruits, and the most valuable part of our grains, are those parts placed by nature, having the fullest exposure to the sunlight.

In all new countries, men are deceived. They will tell you that their trees bear abundantly, and that the fruit is fair. On a new soil, these conditions will generally exist. This will not always last. With all our efforts, many of our best fruits are gradually losing their early value, and our trees their former productiveness. This condition may arise from various causes —one, the gradual loss of the appropriate matter in the soil, necessary to maintain the healthy functions of tree life. As one means to restore this loss, and to furnish the requisite elements to the soil, I would suggest that the ashes both of wood and coal be utilized as a fertilizer. Our towns and cities furnish a large amount that would go far toward restoring the annual loss caused by the production of large crops of fruit, and the waste caused from tree growth. The silent power of vital force, that can select atom by atom the particles of inert matter, and convert into living tissues, should be better understood. I do not pretend to say that this vital force has the power—shall I call it instinct?—to select such matter, even if furnished, that will at all times secure a healthy fruit—free from rot or scab (fungi.) That form known as *rot*, either in the apple, peach, or grape, we conceive must propagate itself, as has been expressed by others, by the introduction of the mycelia of this fungoid growth, entering the tissues either of the tree or fruit, which give rise to the reproductive bodies at once. When the normal condition of the tree or plant is such that it can

grow without deterioration from climatic causes, I cannot see why we should not be able to arrest, to a very great extent, this and other forms of mildew, both in the apple and other fruits, by the use of proper fertilizers. The steady increase of the various forms of mildew in and on our fruits, should awaken the most serious apprehension among our fruit-growers.

I would say, as before stated, that I have much confidence in full and open exposure to sunlight and air. As a further evidence of the sun's influence, it is well known that this low form of life is found more prevalent as we reach the higher latitudes, and also that it is oftener found in places that are cold and damp. As another means to save our fruits from loss, I have thought that where an orchard is annually pastured (with cattle—and young are better) except during the season of the fruit's maturity, that the fruit was fairer and more abundant. I have watched an orchard thus treated for the past ten to fifteen years, and can attribute the favorable results only to clean culture induced by pasturage, and to the daily consumption of the waste and fallen fruit by the stock. This orchard was annually mulched, which I consider necessary in every place where the soil is not stirred or cultivated. I believe that a clean and open surface adds very much in preserving our orchards from the depredations of insect, parasitic and fungoid life.

To aid all these, the careful hand of the pruner comes in. The want of a better and more general knowledge under this head is painful to witness, not only in our public parks, but especially in our orchards. The loss to planters, from this cause alone, can not easily be estimated. Whereever a fork is suffered to grow, it only ensures, sooner or later, the destruction of the tree. Branches having a *relative* length and size should alone be suffered to grow on any fruit or shade tree. To do this work *well*, very much depends upon the practiced eye and judgment of the skilled cultivator (pruner). I hardly need say that the pyramidal, at least as nearly so as the habit of the tree will admit, is the form that experience has most generally approved. A proper system of pruning appears to be as essential to the life and health of the tree as it is to secure a healthy and well grown quality of fruit. Both fruit and shade trees having branches over-large are liable to be broken down by excessive bearing, high winds, and also by the ice of winter. Excessive pruning, however, should always be avoided, and is never necessary if a judicious system is practiced when the trees are young. Annual prunings, although slight, should never be neglected—in the spring, by shortening in of all branches having an undue extension, and the removal of, or shortening in of, all branches that are dead or decaying; in the summer, by the removal of suckers, which, as a rule, should be performed by the hand.

The height of trunk should be such as to secure air and sunlight, but never so high as to bare it to a full exposure of the sun's rays. The trunk-borer seldom fails to make his home in this exposed surface. To speculate upon, or to even recommend a remedy for this enemy, is to remove the cause. We in this instance, as in many others, induce disease when we turn aside from life's normal condition. I would not, however,

have it inferred from this view, that the scab (parasitic fungi) depends on diseased tissues, a doctrine advocated by some writers on mycology.

In conclusion, I would say that no person can feel more keenly than myself, the mistakes made in the early management of our first planted orchard trees. It is a pleasure to know, however, that the lessons of experience that unfold themselves from day to day are leading us to a more correct knowledge in all that pertains to the business of horticulture.

DISCUSSION UPON APPLE ORCHARDS.

Mr. Galusha said that he presumed the intention of the Doctor, in recommending plenty of sunlight and air, was to advise the exposure of *leaves* to sunlight. The theory formerly prevalent—that to have good fruit it must be exposed to the sun—was not sustained by experience and extended observation. The leaves should have sunlight, and the early training—not pruning off large limbs—of the trees should be such as to have branches distributed on all sides of the tree, so as to give light and air to the leaves. He was convinced that the most and best fruit is found wherever there is the best development of leaves, though none of the fruit is fully exposed to the rays of the sun. And with grapes, it is absolutely certain that the best fruit is found in the shade of the healthy foliage which has developed it.

Mr. Wright exhibited two trees cut off in the nursery, and explained the best mode of pruning, viz., to so shorten in the young shoots as to prevent the formation of any forks, and *distribute the branches around a central stem*, from near the ground upward, so that the foliage will shade the trunk and distribute (balance) both foliage and fruit.

This interesting talk on tree forms can not be given without a representation of the specimen trees upon which it was based.

Mr. Woodard said that in his paper sent to the State Horticultural Society, last month, he wrote to some extent unfavorably to protecting-belts of timber for orchards; but he did not wish to be meant to say that a country would be a better fruit country without any groves. On the other hand, he would recommend planting groves on every farm, both for wind breakers and for supplying timber for future use. But he had observed that *immediate* (close) protection or screening was not advantageous, and sometimes was injurious; as trees need light, and a circulation of air.

NEW SEEDLING PEAR.

Dr. Pennington distributed among the members some cions of a Seedling Pear—a seedling from the Bartlett tree, more hardy, and fruit of good quality, ripening about the same time as that of the parent tree. He had two trees, one Bartlett and the other Flemish Beauty, which stand in the angle of two deep drains, and have been healthy and productive. He spoke of his artesian well, and expressed the hope that such wells would soon become quite common upon the prairie farms of Northern Illinois. His well is 1,070 feet deep, flowing at a hydrostatic level of five to ten feet, from forty to fifty barrels per minute; water 59° to 60° temperature.

DISCUSSION ON RASPBERRIES.

On motion of Mr. Galusha, it was voted to devote a half hour to the discussion of Raspberry Culture.

Mr. Slade said he had cultivated an acre of Doolittle for five years, but he regarded it as not worthy of cultivation, compared with others. The Philadelphia and Purple Cane he regarded as the two best among the red varieties. He valued Davison's Thornless highly, and if confined to one sort, he would take this. The McCormick (Mammoth Cluster) was next in value, and coming later, these two varieties, with the two red ones named, would answer the needs for home use and for market. He described the Seneca as a larger black-cap berry than the McCormick, and the bushes quite productive. His soil is timber soil, near Fox River.

Mr. Budd, and one or two other members, had not found Davison's as profitable as had Mr. Slade. Mr. Budd said it is more sensitive to drought than other black-caps.

He finds the McCormick, or Mammoth Cluster, larger than the old Miami, with which it is claimed to be identical. The Seneca was not as large with him as the McCormick.

Mr. Scofield said Davison's was too seedy, after the first pickings; Philadelphia is best. His soil is prairie.

Mr. McAfee said we should be careful not to make too broad assertions. Soils and locations have much to do with the value of varieties. Davison's Thornless is not usually as lusty a plant as Doolittle, yet with rich culture it was, perhaps, the best one variety for a family garden. He had grown Davison's, Doolittle and Mammoth Cluster, and had picked as much fruit from Davison's as either of the others.

He condemned the practice of cutting out the old raspberry canes as soon as the fruit is gathered; for as long as these canes had green leaves upon them, they were storing up food *in the roots* of the stools for the benefit of the succeeding year's fruitage; therefore, should not be destroyed until all the leaves upon them had died or fallen.

Messrs. Bryant and Galusha testified to the effect that the Davison's was not a choice berry after the first pickings, and not as valuable with them as Philadelphia or McCormick; that good culture and manure are requisite for a large crop and large fruit.

Mr. Scofield spoke favorably of a new variety—name not given—from Galena.

Mr. Powell has a little less than an acre of Doolittles, and gets two thousand quarts per year. He takes out the old wood in spring.

Mr. Wier has cultivated a large number of varieties; but now wants only three of those tried, viz., Doolittle, McCormick and Philadelphia. Davison's is not as good with him as Doolittle; Philadelphia, best of all, for profit. He said the acari prey upon Davison's most, and Philadelphia least, of the varieties he has. A larva of a small fly, gray, half an inch long, defoliates, and sometimes destroys raspberry plants.

Several other members participated in this discussion without eliciting any new facts. [For previous discussions upon raspberries, see pages 165–171.]

Mr. McWhorter, from Committee on Fruits on exhibition, made the following report:

REPORT OF COMMITTEE ON FRUITS.

Your Committee on Fruits would report that but very few fruits have been presented for examination.

S. G. Minker exhibited ten varieties, remarkably large and fair for the unfavorable season. Among these the variety known as the Minkler seem to hold a good character.

Tyler McWhorter, of Sterling, exhibited twelve choice varieties, which are also very fair.

D. J. Piper exhibited six varities.

M. B. Spafford, six varieties.

C. V. Powell. five varieties.

Dr. Pennington exhibited some remarkably fine specimens of Vicar of Winkfield Pears, in a good state of preservation.

(Signed,) TYLER McWHORTER, *Chairman.*

Mr. McAfee complimented the State Board of Agriculture for giving so many and liberal premiums for horticultural products, and exhorted the members to exhibit their fruits at the State Fair.

Mr. Ellsworth, member of that Board, said that the premiums were now such as should call out large exhibitions of fruits, plants and flowers, and hoped members of horticultural societies would see by this token that the Board appreciate horticulture; and that they would make an effort to co-operate with the Board by making larger exhibitions.

DISCUSSION ON BLACKBERRIES.

By vote, a half hour was devoted to discussion on Blackberries.

Mr. Budd called attention to a new blackberry, which had been introduced into Iowa by Mr. D. W. Adams, Master of the State Grange. It is called the Barnard; is hardy and of good quality; has never been winter killed.

Mr. Scofield said the Ancient Briton proved hardy at Freeport, and bore heavy crops of fruit, of excellent quality.

Mr. Wier remarked that if the side branches of blackberry plants were shortened in occasionally, during the season, it would increase the thickness and firmness of the shell, or woody portion of the stems, reducing the proportion of pith, and render them hardier and better able to withstand the rigors of winter; that much depends upon soil and location; as no variety is good, and hardy everywhere; that all the species of the Rosacæ family are preyed upon by mites, and are liable to be destroyed by them.

Mr. Douglas was asked about the Western Triumph, and said he thought it better than most varieties growing in the woods; the plants seemed hardy.

Mr. Wier said Kittatinny bushes should never be cut in the fall, as it endangered their lives; but should be pruned in spring.

Adjourned till half past seven o'clock this evening.

THIRD DAY.

EVENING SESSION.

Met at half past seven.

Messrs. L. Woodard and L. K. Scofield were appointed delegates to the meeting of the Wisconsin State Horticultural Society, which takes place next week.

THE PRESIDENT announced that the discussion of Strawberries was the first thing in order.

Several members spoke of the destruction of plants by the cold of last winter, and by the strawberry worm—leaf roller—already described.

MR. BUDD said that a neighbor of his had used salt on his strawberry plantations for six years; he now sows eight bushels per acre. This seems to keep off the white grub, so often destructive in strawberry beds, and his plants were also free from the strawberry worm. The salt seemed to benefit the crop, while it destroyed the weeds, especially the dandelions.

MR. DOUGLAS said that it requires three years for the white grub to mature; he had used at the rate of ten bushels salt per acre, without perceptible effect.

MR. HILL said June grass and white clover are the worst enemies in a strawberry field; but salt enough to kill them would kill the strawberry vines also.

MR. WIER said that the only remedy for grubs that he knew is keeping the ground entirely clean by cultivation one year; the grubs cannot live without live plants to feed upon.

If he was confined to two varieties for his own use, they would be the Nicanor and Kramer.

MR. MCAFEE—The white grub spoken of will perfect itself where no living vegetable tissue exists. Mr. Budd did not say that the salt positively killed the grubs upon his neighbor's strawberry field, but that the plants were not devastated upon by grubs or other insects, while other plantations in the vicinity were. Salt sometimes changes the mechanical condition of the soil; and, perhaps, it was so in this case.

MR. SLADE had applied ashes to a part of his plants, and the portion thus treated had been more preyed upon by grubs than other parts of his grounds. He had mulched a part of his vines with corn stalks, but did not perceive that this affected the work of the grub either way.

MR. WRIGHT had rows of Kentucky, Wilson and Green Prolific, side by side, and the Kentucky was the only one that survived the last winter.

He had sown salt for the last three years on a part of his vines; the portion salted was free from strawberry worms, while other portions were infested with them. Salt will kill red sorrel. He sows it in March; also sows salt in March on ground which is to be planted with strawberries the next month.

Mr. Wier said he had grown strawberries for market many years. His plan now is to set out and cultivate in rows for one year, then let them run and occupy the ground one year; then run a bull-tongue plow through one way in such way as to root out strips of the vines; afterward alternate these strips by plowing up the old vines after the young ones have occupied the previously cultivated strips. He finds it profitable to grow some early variety, as the Iowa.

PLUMS.

On motion, it was voted to devote twenty minutes to discussing Plums, and that no member should speak more than three minutes on any one subject.

Mr. Wier opened the discussion by speaking in praise of the Wild Goose Plum—said it was hardy, of good size, although liable be stung by the curculio, yet the larvæ did not develop in it; the tree was a good bearer.

Mr. McAfee recommended dwarfing the Hinkley by grafting on roots of the wild plum. The cion will afterward take root, and thus the tree stand on its own roots.

Mr. Ellsworth has found the Hinkley tender at Naperville.

Mr. Montague has stiff clay soil, but has had but one crop of plums in ten years. The Hinkley (or Miner) did not bear with him.

Mr. Scott said his experience in grafting on roots of wild plums was similar to that of Mr. McAfee.

Mr. Powell said Hinkleys drop when stung by the curculio, but Lombards do not.

Mr. Wier recommended grafting Wild Goose cions upon the side roots of peach seedlings.

PEARS.

Mr. Woodard recommended Flemish Beauty and Buerre d. Anjou.

Mr. Montague has had better success with Flemish Beauty than any other; it had never blighted with him, while Bartlett had.

Mr. Douglas said his Bartlett trees did splendidly last year. The Flemish Beauty used to be his favorite; he had sold the crop from a single tree for thirteen dollars. The Flemish Beauty had cracked, latterly, and he had no good fruit of it. He thought well of Howell.

Mr. McAfee said that an insect, said to resemble Walsh's plum gouger, has been found to cause the roughness, or knotty appearance of pears.

A discussion upon "pears in grass" and pears in cultivation ensued, but resulted in nothing new, as many members had blight on trees in grass to an equal extent, proportionately, as on trees in cultivation.

Mr. Scott said he had been offered from fifteen to thirty dollars in different years, for the fruit upon a single Flemish Beauty Pear tree. It stands on high ground with gravelly subsoil. Pear trees are more exempt from blight when old than while young.

A member asked Mr. Wier for a list of pears which were not injured by the last winter, and he presented the following:

Pears that withstood last winter almost perfectly: Berkett, Howell, Clapp's Favorite, Mt. Vernon, Flemish Beauty, Buffam, Buerre d. Anjou.

The Secretary read the following communication:

Sporting of the Grape Vine.—There have been several statements published of the grape vine sporting or changing the identity of its fruit; but I believe they have not clearly demonstrated it.

I have a row of twenty vines that had previously borne two crops of Taylor's Bullet fruit. Last spring they set remarkably full of fruit for that variety, but when the fruit ripened it was all very small, black, sour grapes; a portion of it was borne on the spurs of the vines that had previously borne the Bullet fruit. The vines stood out unprotected last winter, but they did not appear to be materially injured, and have made their usual strong growth. My other vines, that were protected, have borne the Bullet fruit as usual. The Bullet has not proved of much account with me, except for stocks to graft other varieties upon. The Delaware does not take so freely to the Clinton as it does when grafted on the Bullet, or wild vines; they give a stronger growth, larger bunches, and more perfect fruit. A friend examining my grafted fruit last season, remarked that it appeared more like ears of corn than bunches of Delaware grapes; the fruit was so compact on the bunches as to press it into the shape of ears of our western corn. P. MANNY.

The President announced as the topic for discussion

THE CHERRY.

Mr. Woodard—I get the nicest Early Richmond cherries from trees grafted on Mahaleb stocks. Those grafted on the Morello overbear, and consequently the fruit is not as large and fine.

Mr. Ellsworth—Trees on the Morello stock show feebleness after a few year's bearing, while those on Mahaleb are vigorous, long-lived trees. The time is not far distant when this stock will be most popular.

Mr. Galusha—At an early day I made a careful study of trees worked upon each of these stocks; gave my preference to the Mahaleb, and have never changed my mind. While trees upon this stock do not bear full crops as young as those on the Morello, yet they make larger, better trees; have larger, better foliage and fruit; and when they attain sufficient size and strength to sustain crops, will bear as full crops as it is safe for any trees to bear; and what is an important item, they *do not cover the ground with suckers* as Morello stocks do. I have always found it hardy.

MR. WIER—At a meeting of the State Society, five or six years ago, at Champaign, the Mahaleb stock was a by-word; yet it is the right stock for long bearing and vigor; the Morello will do for immediate fruiting.

I will tell you how to grow sweet cherries as certainly as the Early Richmond: Plant Early Richmonds one year old, and bud them with sweet cherries, in August, in the top of the trees, in twigs of current year's growth; then don't allow branches of the stock to overgrow or shade out those from the buds. I bud near the base of the shoot, and allow a branch of Early Richmond to grow by the side of that from the bud, yet keep it in check as before stated.

I grow sweet cherries on Mahaleb stock by letting them branch as near the ground as possible. The hardiest variety in wood is the Shepherd; next is the Purple Guigne; then the Rockport Bigarreau and Dacotah.

THE PRESIDENT testified as to the hardiness of Gov. Wood cherry.

MR. DOUGLAS said he sometimes had a partial crop of sweet cherries from trees in a grass plat; did not believe they could be grown in black prairie soil.

MR. BRYANT—When I have seen Dr. Hull, Mr. Wier or any other man, grow crops of a few varieties of sweet cherries in my neighborhood, I will believe it can be done, but not before. I have made many attempts on Morello stocks, leaving side branches, as described by Mr. Wier, but could get no fruit to amount to much.

MR. SLADE said there are two trees near Elgin, twelve years old, one a sweet cherry and the other an Early Richmond with sweet cherries grafted upon one half of it, and he had watched these trees for six years, but could not see but the sweet cherries bore as well as the Early Richmond part.

MR. WIER—You can not grow sweet cherries if the trees are trimmed up so that the sun will shine on the trunks. I know a few trees in Lacon, planted on the north side of a building, which are healthy.

STATE ENTOMOLOGIST.

MR. SCOTT offered the following resolutions:

Resolved, That this Society appreciates, and would hereby recognize, the pre-eminent services rendered the Horticultural and Agricultural interests of the State, by Dr. Wm. LeBaron, our State Entomologist, in his particular department of study and investigation.

Resolved, That we cordially recommend Dr. LeBaron's re-appointment and confirmation in the position now held by him.

Resolved, That a certified copy of these resolutions be sent the Governor of the State.

The resolutions were adopted.

Several gentlemen who had seen the Leib Cherry in tree and fruit, spoke favorably of it as a valuable variety for the northern, and perhaps the more southern, portion of the district.

FINAL RESOLUTIONS.

Mr. Edwards, from Committee on Final Resolutions, reported the following:

1. *Resolved*, That the thanks of this Society are hereby tendered our retiring officers for the faithful discharge of their duties.

2. *Resolved*, That we return our thanks to the officers of the C. & N. W. and Ill. Central Railroads, for granting reduced rates of fare on return tickets to our members.

3. *Resolved*, That we have been highly gratified and aided by the attendance of our friends from Iowa, Wisconsin, and Indiana, and trust they may find it convenient to come often again in increased numbers.

4. *Resolved*, That the citizens of Sterling and vicinity, by their cordial reception and generous entertainment, eminently deserve, and we hereby tender them, our cordial thanks.

5. *Resolved*, That in being again permitted, with numbers undiminished by death, to enjoy another pleasant re-union and profitable consultation, we recognize the kindness of Him "in whose hands our breath is," and "whose mercies are over all His works."

C. W. RICHMOND,
LEWIS ELLSWORTH,
SAMUEL EDWARDS,
} *Committee.*

The Society then finally adjourned.

OFFICERS

OF

Northern Illinois Horticultural Society, for 1874.

President—Tyler McWhorter, Aledo, Mercer county.

Vice-Presidents—H. C. Graves, Sandwich; L. K. Scofield, Freeport; E. H. Beebe, Geneva; D. F. Kinney, Rock Island.

Corresponding Secretary—D. W. Scott, Galena.

Recording Secretaries—Edmund Hathaway, Damascus; C. W. Richmond, Naperville.

Treasurer—L. Woodard, Marengo, McHenry county.

STANDING COMMITTEES.

On Orcchards and Vineyards: A. Bryant, Sr., Princeton; S. G. Minkler, Oswego; Dr. L. S. Pennington, Sterling.

Timber and Ornamental Trees: O. B. Galusha, Morris; C. G. Austin.

Floriculture: Mrs. A. Hillis, Galena; James W. Scott, Galena.

Meteorology: H. H. McAfee, Ames, Iowa; Dr. N. E. Ballou, Sandwich.

Ornithology: A. L. Cummings, Galena.

Botany and Vegetable Physiology: Mrs. P. V. Hathaway, Damascus; Mrs. S. C. Harris, Galena.

Landscape Gardening: J. P. Bryant, Princeton; Edmund Hathaway, Damascus.

Entomology: Dr. Wm. LeBaron, Geneva; Dr. Shimer, Mt. Carroll.

Timber-Planting: R. Douglas, Waukegan; Samuel Edwards, Princeton.

Marketing and Utilizing Fruits: Jona. Periam, Chicago.

GALESBURG HORTICULTURAL SOCIETY.

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